February 19, 1945

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

TECHNOLOGY DEPT

MAINTENANCE OF STRUCTURE IS FUNDAMENTAL IN MACHINABILITY....

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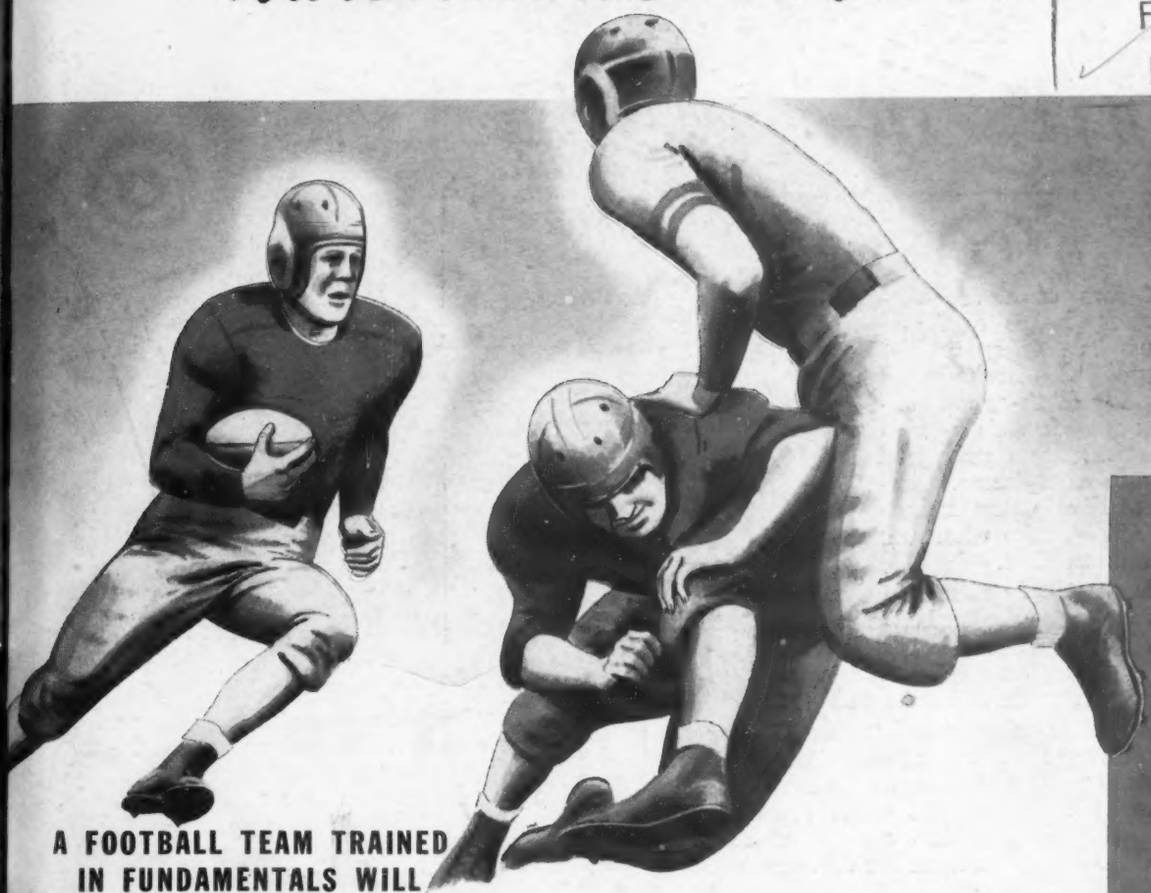
DETROIT



A FOOTBALL TEAM TRAINED IN FUNDAMENTALS WILL EVENTUALLY WIN OVER TEAMS RELYING ON RAZZLE DAZZLE PLAYS

How often have you witnessed a football game on an autumn Saturday afternoon between a team relying almost entirely on trick plays, but noticeably weak in blocking and tackling,—the other team definitely schooled and trained in *fundamentals,* relying on good blocking, deadly tackling. The razzle dazzle team gives the spectators some thrills—but the team trained in football fundamentals usually comes through with the winning score.

Wyckoff metallurgists recognize that the continual reproduction of a desired structure is *fundamental* to the maintenance of consistently satisfactory machining production.

Wyckoff will welcome the opportunity of explaining the *fundamentals* of Structure Controlled Annealing.

WYCKOFF STEEL COMPANY

General Offices: PITTSBURGH 30, PENNA.

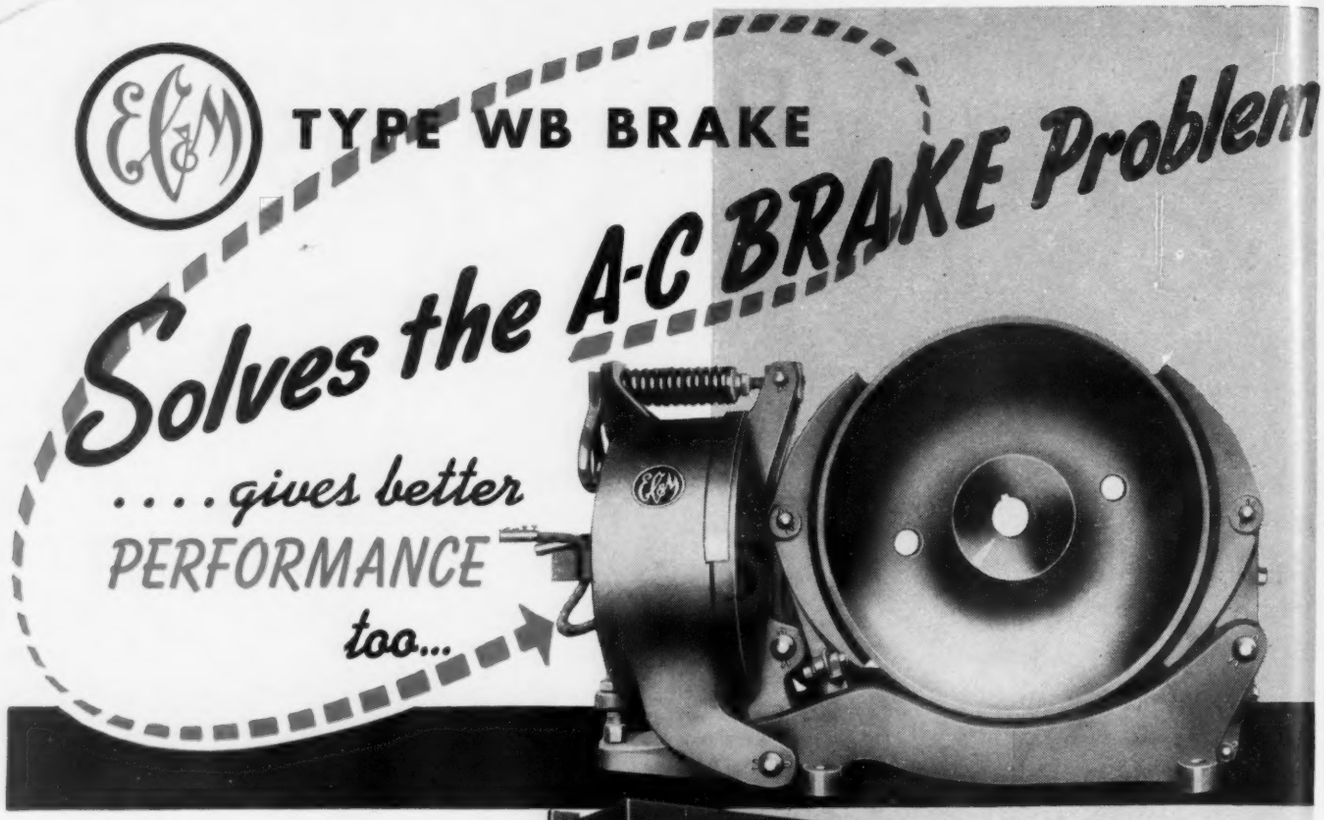
Works: AMBRIDGE, PENNA., CHICAGO, ILL., NEWARK, N. J., PUTNAM, CONN.

Manufacturers of Carbon and Alloy Steels . . . Turned and Polished Shafting . . . Turned and Ground Shafting . . . Wide Flats up to 12"x2" . . . Complete Annealing and Heat Treating Facilities.

TYPE WB BRAKE

Solves the A-C BRAKE Problem

. . . . gives better PERFORMANCE too...



Rectifier - Unit in compact form for separate mounting on existing installations.

MANY users of a.c. motor-driven cranes, hoists and machinery are switching to the EC&M Type WB Brake with rectifier-unit. Its *high-speed performance* and *reduced up-keep* for a.c. circuits have prompted its nationwide acceptance. Repeat orders indicate standardization on the WB Brake wherever a.c. brakes are needed.

These brakes not only eliminate the laminated members required in a.c. brake design, but give quick response. High initial current insures *fast release;* automatic reduction of the holding current results in *fast setting.*

The rectifier-unit is compact and is arranged for separate mounting for existing installations. On new projects, it may be combined with the motor control panel. Bulletin 1006 gives complete details on WB Brakes for a.c. operation. Bulletin 1004-D describes them for d.c. service.

THE ELECTRIC CONTROLLER AND MANUFACTURING CO.

2698 East 79th Street — Cleveland 4, Ohio

REDUCED UP-KEEP *and* BETTER OPERATION

because

No laminated magnets or plungers.
No destructive hammer-blow.
No a.c. chatter.
No coil burn-out due to shoe-wear affecting air-gap.
No motors, gears or pumps.
Has fast release and fast set.
Has ability to permit accurate inching.
Has hand release.
Has solid cast-steel magnet and armature.
Has short armature-movement.
Has thick, molded brake blocks 1/4" to 3/4" thick.

On Cranes, Hoists and Machinery ...the EC&M Type WB Brakes *give* HIGH SPEED PERFORMANCE —REDUCED UP-KEEP

Roughneck

A versatile and powerful brute is the tractor. With bulldozer attachment, it's hacking its way through the far-away jungles of the Pacific . . . knocking down trees, clearing out the underbrush, cleaning up airstrips, even burying enemy dead. In Europe, too—in fact, wherever the war has moved—the tractor has taken on a formidable list of roughneck assignments.

Alloy steels have helped to make the tractor tough, and this is nowhere more apparent than in its laminated springs. These springs must be so strong, so durable, that there is never any question of their dependability. In a jungle clearing, for instance, thousands of miles from nowhere, it is not always possible to repair or replace them quickly.

A great many of the fighting tractors overseas are equipped with springs of Bethlehem alloy steels—usually of a silico-manganese-chrome or a nickel-chrome-molybdenum type. Because of the extreme service conditions, the springs must pass severe deflection tests before being installed.

The uniformly high physical properties of Bethlehem alloy steels are due in large measure to close chemical control, careful billet preparation, controlled cooling of billets, and the most modern rolling methods. If you have a question that involves spring steels, feel free to consult with Bethlehem metallurgists at any time. They will be glad to work closely with you on both present and postwar problems.

BETHLEHEM STEEL COMPANY
GENERAL OFFICES: BETHLEHEM, PA.

Bethlehem Steel Export Corporation
New York City

BETHLEHEM ALLOY STEELS

★ BETHLEHEM STEEL ★

EARTHMOVERS

Moving earth for supremacy in war has been one of the outstanding accomplishments of R. G. LeTourneau, Inc. Cincinnati Shears have helped in the rapid and low cost production of LeTourneau products.

Write for Catalog No. S-4 for detailed description of the Cincinnati Line of Steel Shears.

Photo Courtesy of R. G. LeTourneau, Inc.

THE CINCINNATI SHAPER CO.

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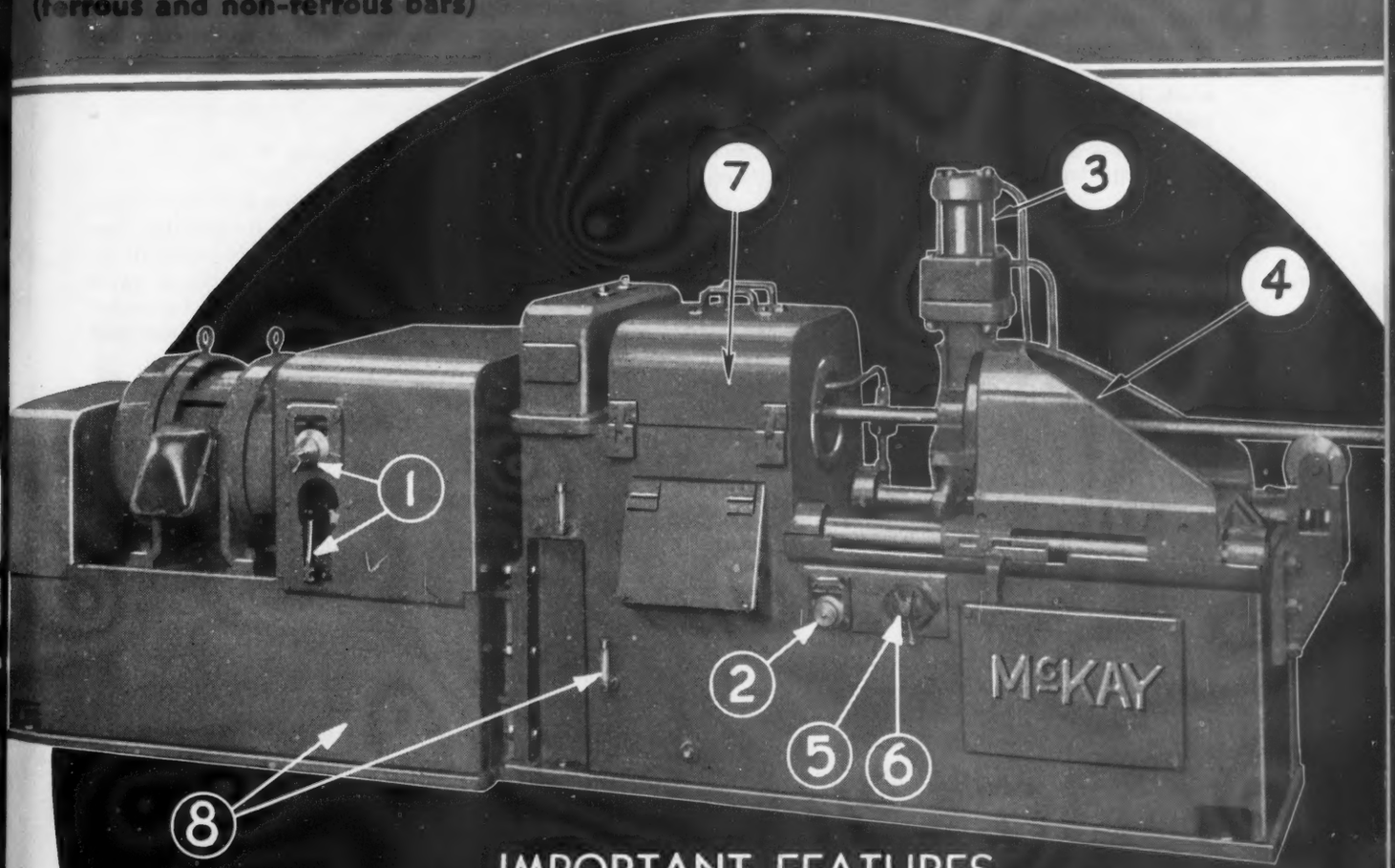
ROTARY HYDRAULIC BAR POINTER
COMPLETELY HYDRAULIC AND FULLY AUTOMATIC

machine designed and engineered for the Cold Drawn Bar Industry (ferrous and non-ferrous bars)



IMPORTANT FEATURES

1. Finger tip control of tool speeds (from minimum to maximum)
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ENGINEERS AND MANUFACTURERS OF TUBE AND BAR DRAWBENCHES AND BAR SHEARS

YOUNGSTOWN, OHIO

PERFORMANCE RUGGEDNESS PRECISION AND SAFETY

BEHIND THE SCENES

Typewriter Blues

■ The experts say all you have to do to become a good writer is to sit down and keep writing; eventually you will develop the knack. A small, dissenting voice is our modest Detroit Editor, Art Allen, who sat down eight years ago to do a weekly 1400-word stint for STEEL's Mirrors of Motordom and has been doing it ever since. He figures he has ground out some 416 editions, plus eight Yearbook specials, aggregating about 600,000 words (How long was *Gone With The Wind?*). On top of this he has handled the Wing Tips section for about three years, which adds another 145,000 words, or in all about three-quarters of a million words.

Of course, we know and you know that no one in the whole business paper field can make a typewriter do tricks the way Art Allen can, but he still thinks he needs another three-quarters of a million words of conditioning before acquiring that Peglerian or Lippmaniac touch.

Much Too Rugged

■ Speaking of writing, here is a masterful job of irony which ran as an editorial in a recent issue of the *Wall Street Journal:*

"Two office boys in a Rochester plant procured a cigarette-rolling machine, bought tobacco by the pound and proceeded to produce smokes for which they charge one cent each. They find a ready market to their own profit.

"Personally we think this is a fine idea and our only adverse reaction is one of envy that our own office boys did not have a similar inspiratiton. Perhaps they have been reading the news and have some inkling of the enormity of such proceedings by rugged individualists.

"In the first place these boys in Rochester are undoubtedly violating internal revenue laws. Also they very probably are required to take out a license and this will entail an inspection of their premises to see if all sanitary requirements are being met. When these things are done, along will come the O.P.A. and see if one cent is, or is not an excessive charge, for a bit of paper filled with tobacco. And probably it is not a legal requirement, but it does seem hardly ethical that the boys have not sought a small business loan from some agency in Washington. And is this Rochester plant unionized and are these boys paying dues to the union that has jurisdiction over cigarette rolling? We don't want a strike over the matter.

"Possibly these boys have been reading Horatio Alger. Possibly they think they will grow up and marry the boss' daughters. They'll see. They'll end up hiding in the closet of some well stocked club where the bloodhounds will find them and bay loudly for a host of functionaries to come and get them!"

Note: The exclamation point at the end is ours.

Money To Burn

■ Combine that tale with this one and you may well conclude that money isn't everything. Down in Washington in a certain Federal office you can walk in (if they'll let you), pull out a $10,000 bill (if you have one), light your cigarette with it (if you can borrow one), and the eight employes would not even bat an eye at the proceedings. But if you were to ask one of them for the loan of a buck, you'd be sure to get the brush off.

All this monkey business would be taking place in the Bureau of Engraving and Printing Annex, where they burn up about 10 billion dollars annually of Uncle Sam's folding money. Clarence B. Brower, supervisor of the incinerator, figures that in his 40 years on the job he has burned enough currency to clear up the entire national debt. They say the bills give off an awfully nice glow. We'll have to try it sometime.

Steel Yourselves, Gals

■ The latest wrinkle in stockings (and we're not being punny) is the possibility, postwar, of stainless steel hose for the little woman, since some steel companies are already producing stainless wire comparable to nylon thread. All of which might well open up a big market for miniature welding machines to mend the runs that would probably still plague the dear fair sex.

Good Reading

■ It may be that we've just never seen it, or it may be something brand new, but at any rate the *News Letter* emanating from the industrial division of Walker & Downing, Pittsburgh, is something we plan to look for each month from now on, and perhaps they'll add a few more to the list if you're interested. One startling fact in their February 1 issue was that forty-four thousand "rehabilitated" persons whose physical disabilities had kept them from making enough money to live on, were earning $6,482,225 a month at the end of the last fiscal year. Why, that's twenty-five bucks more a month than we're getting!

Confession

■ Getting back to Art Allen, if we may, he's the guy who really took that ride in the cab of the locomotive, which was written up here a few weeks ago. We thought we could get away with it, but with questions flying at us from all directions we've had to 'fess up and admit we've never been closer to a locomotive than the smoking car.

Among the comments on the piece comes one from Volney B. Fowler, assistant to the vice-president, Electro-Motive division of General Motors, who knew it was Art all the time. He says that one of the hardest boiled of their old timers in the executive group called him the other day, after reading the story, and wanted to know why they couldn't get pieces that accurate printed all the time. Fowler suspects Art of having spent all his early days on a railroad but the guy actually just has one of those photographic minds that takes a picture and then prints a positive with a typewriter.

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Editorial Contents—Page 69

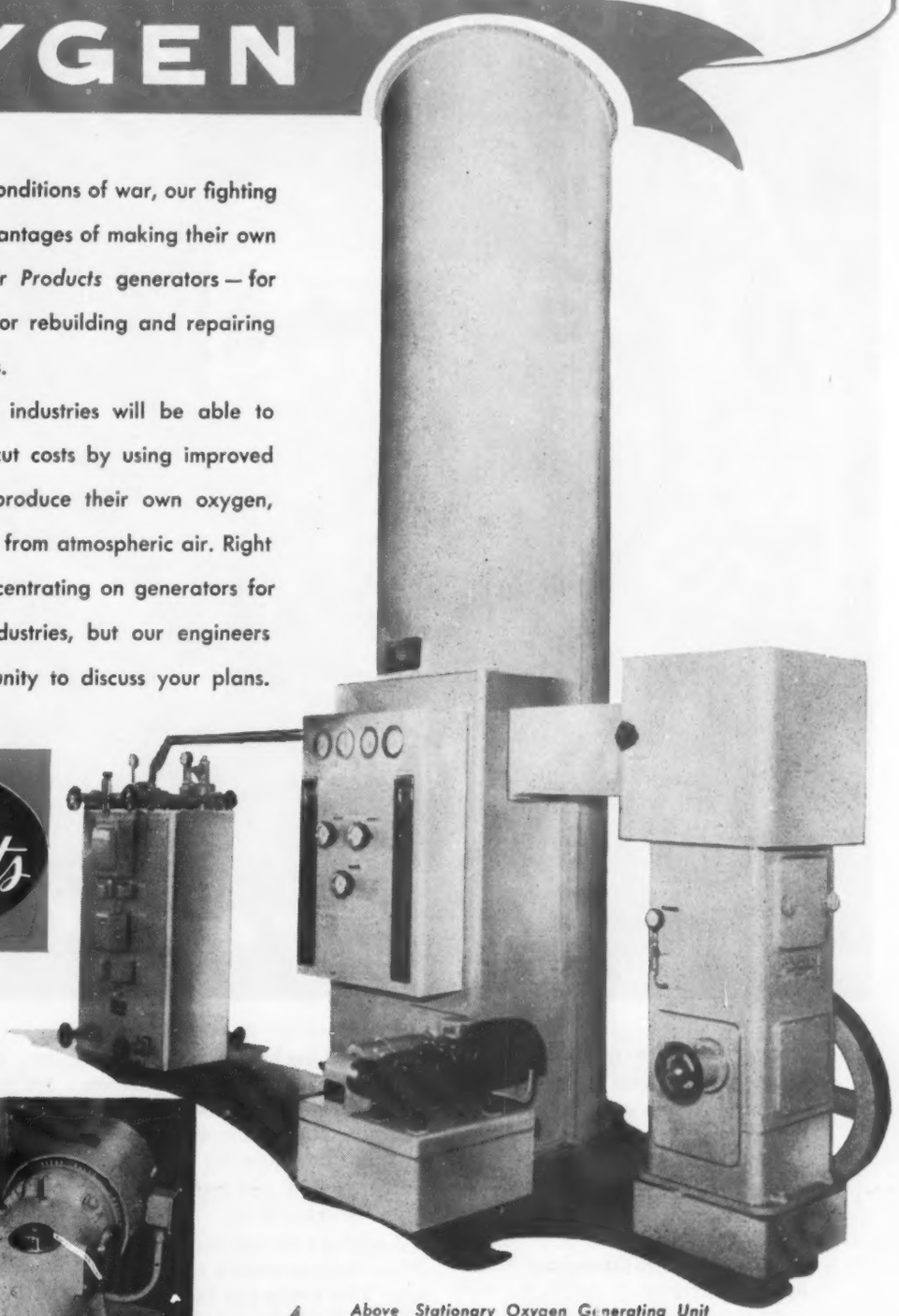
The New Story of OXYGEN

Even under the difficult conditions of war, our fighting men are proving the advantages of making their own oxygen with modern *Air Products* generators — for high-flying planes . . . for rebuilding and repairing . . . for medical purposes.

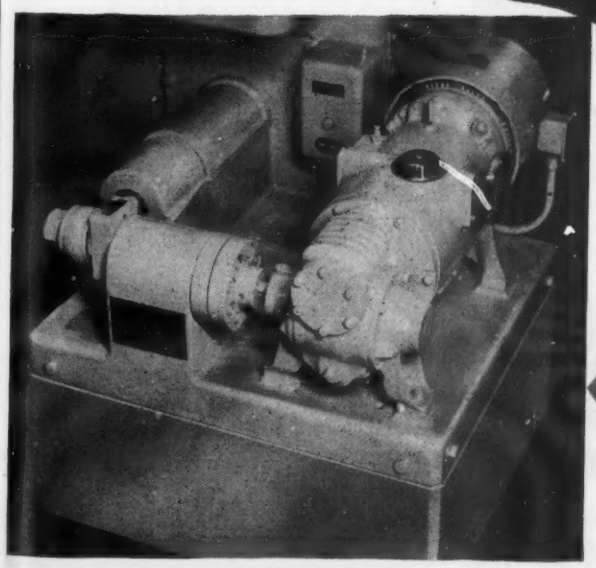
Progressive peacetime industries will be able to increase efficiency and cut costs by using improved *Air Products* plants to produce their own oxygen, nitrogen and other gases from atmospheric air. Right now, *Air Products* is concentrating on generators for military use and war industries, but our engineers will welcome the opportunity to discuss your plans.

Air Products INCORPORATED

Manufacturers Road
Chattanooga 5, Tenn.



Above Stationary Oxygen Generating Unit



New, revolutionary and thoroughly proven is *Air Products'* exclusive oxygen compressing system. It is light in weight, saves space, power, maintenance, and delivers pure oxygen free of water vapor at any required pressure.

Meet Mr. Quality

ONE LOOK AT Bill Seebode — 50 year man at Allis-Chalmers Norwood Works — tells you that he sleeps well nights.

One reason is that he and hundreds of his fellow craftsmen at Allis-Chalmers have won *and are keeping* the confidence of engineers and operating men throughout American Industry.

That means a lot to veterans like Bill who've made a career of building great motors.

Bill's a stator-winder, as you can see—a living example of the truism that *men* make motors.

No machine known can assemble the maze of wiring and insulation that goes into a stator with his skill and care. No machine can fully test how *well* he's done his job.

There's only one test . . . wait 5, 10, 15 years and *see.*

And that's the test that has proved Allis-Chalmers motors are *great* motors. That's why you hear it said so often: *"You can depend on Allis-Chalmers Motors!"*

Yes, hundreds of Allis-Chalmers men—*quality* men like Bill Seebode — know they have a big personal stake in every Allis-Chalmers motor. When they build a great motor for you, they're making a friend . . . and they know that's something no company and its workers can have too many of. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

• • •

♪ *Tune in the Boston Symphony, Blue Network, Saturday at 8:30 pm, EWT.*

AC WE WORK FOR VICTORY WE PLAN FOR PEACE

A 1729

YOU CAN DEPEND ON ALLIS-CHALMERS MOTORS

JESSOP
Stainless Steels

Meet
EXACTING SPECIFICATIONS AND CONDITIONS

★ Successful machining of stainless steels is often dependent upon the selection of the correct analysis and specific physical properties. Varying alloy content not only is responsible for properties of resistance to corrosion and oxidation but also for machining characteristics. To aid you in selecting the best steel for your application, Jessop metallurgists are prepared to advise not only on chemical properties but also machinability. Free-machining grades of regular analyses are recommended on applications where involved and extensive machining is required. Jessop Stainless bars are available hot rolled, cold drawn, and centerless ground as further aids to processing. Investigate the advantages of Jessop Stainless Steels.

Established 1901

JESSOP STEEL COMPANY
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HELPS MAKERS OF

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MEET CRITICAL SCHEDULES

Fast-Working Oakite Materials and Methods Speed Cleaning, Rust Removal and Surface Conditioning Operations!

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Specially designed, time-saving Oakite materials and thorough, effective Oakite methods are playing their part in helping reduce the ratio of rejects after such important operations as machining, brazing, soldering and welding.

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Other critical items on which specialized Oakite materials are helping expedite essential production are large and small caliber ammunition, rocket shells, gun tubes, bombs, tanks, armor plate, and other war matériel.

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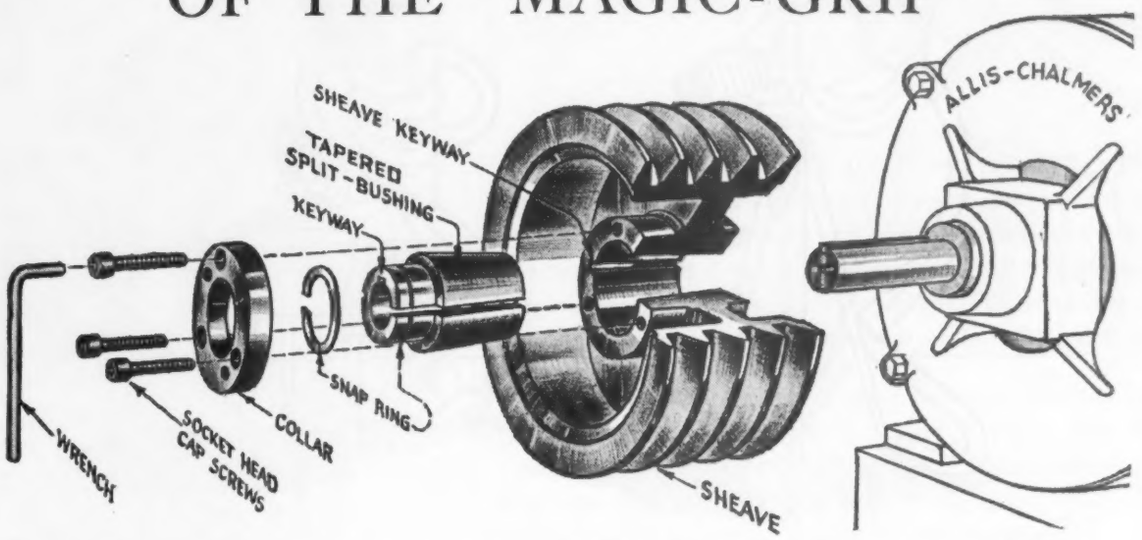
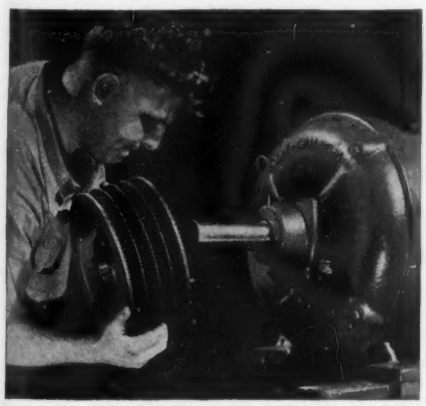
OAKITE MATERIALS...METHODS...SERVICE

CLEANING FOR EVERY CLEANING REQUIREMENT

Here's the Secret
OF THE "MAGIC-GRIP"



Exploded view shows why Allis-Chalmers' new "Magic-Grip" Sheave goes on *as a unit in 3 easy steps.* It's the fastest mounting sheave on the market—at no extra cost.



1 Place sheave on shaft. Slides on smoothly because clearance is provided by expanded bushing. There's *no* hammering — *no* forcing! Complete sheave and bushing unit comes intact—ready for quick, easy mounting.

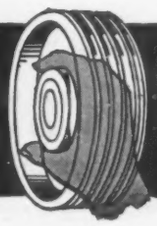
2 Slide to desired position. Sliding easily, sheave can be placed *exactly* according to straight-edge . . . giving you true alignment with resulting smooth performance. A minimum of time is required.

3 Tighten three capscrews — and it's ready to go! Entire sheave is locked securely to shaft and *grips like magic!* No set screws to damage shaft. Send for Bulletin B6310. Allis-Chalmers, Milwaukee 1, Wis.

A 1764

Allis-Chalmers Texrope

"MAGIC-GRIP" SHEAVES



"NO PICTURE TELLS THE WHOLE STORY"

. . . say WICK and SPEN, the Wire Men

● The Chinese could not have been referring to steel wire when they said one picture was worth a thousand words. For no picture of wire will tell you how it will act as it passes through the various forming tools.

As makers and workers of wire we at Wickwire Spencer know that unless wire is uniform in size, tensile and stiffness, tools take a beating and the finished product may fail in actual service. You may want a soft, ductile wire that will stand severe forming—or one that's strong, tough, hard drawn or tempered. But whatever type you want we can meet exact specifications.

Every step in the manufacture of Wickwire Spencer wire is taken in our own plants. Our metallurgists determine the service requirements of the wire and establish the carbon content, annealing, cleaning, finishing procedures and laboratory control tests. As a further assurance of quality, we make the steel in our own open hearths and draw it in our own modern wire mills.

Our large volume of repeat business from hundreds of old-time customers is evidence of the uniform high quality of Wickwire Spencer wire. If you want steel wire of any size, temper, analysis or finish; round or shaped . . . let us have your specifications.

Send your wire questions to

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H. P. M. All-Hydraulic FORGING PRESSES ARE NOT LIMITED TO THE PRODUCTION OF SMALL, SIMPLE SHAPES

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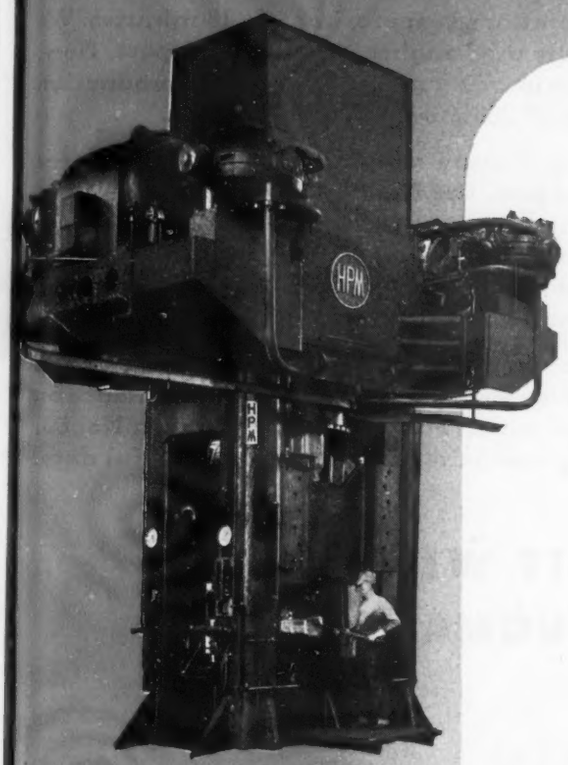

Press forgings are no longer limited to small, symetrical shapes. H-P-M "All-Hydraulic" forging presses are built in many sizes, with speeds and pressure capacities to meet practically every forging requirement. H-P-M self-contained forging presses with capacities up to 5000 tons are now in operation, and still more powerful units are available.

The H-P-M "All-Hydraulic" press produces a steady squeeze pressure which forges the metal as it flows into the die cavities. Impact stresses are negligible. The structure, grain flow and strength of H-P-M press forgings compare equally with those produced by impact forging machines.

Investigate the outstanding advantages of H-P-M self-contained hydraulic forging presses. They are extremely versatile and cost less to install, operate and maintain. Write today for Bulletin 4407.

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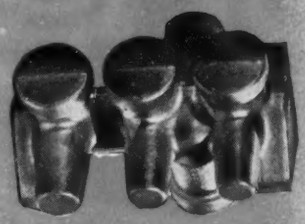
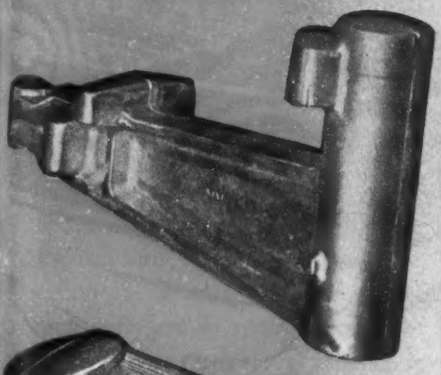
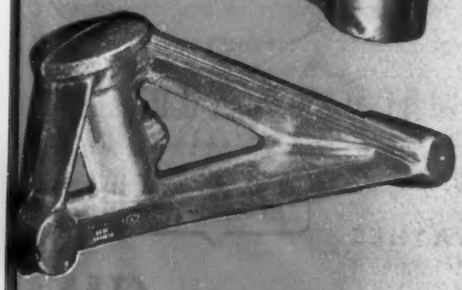






Lodge & Shipley Lathes at work

. . . ACHIEVING A 250% INCREASE IN PRODUCTION OF TRANSMISSION MAIN SHAFTS AT AUTOCAR

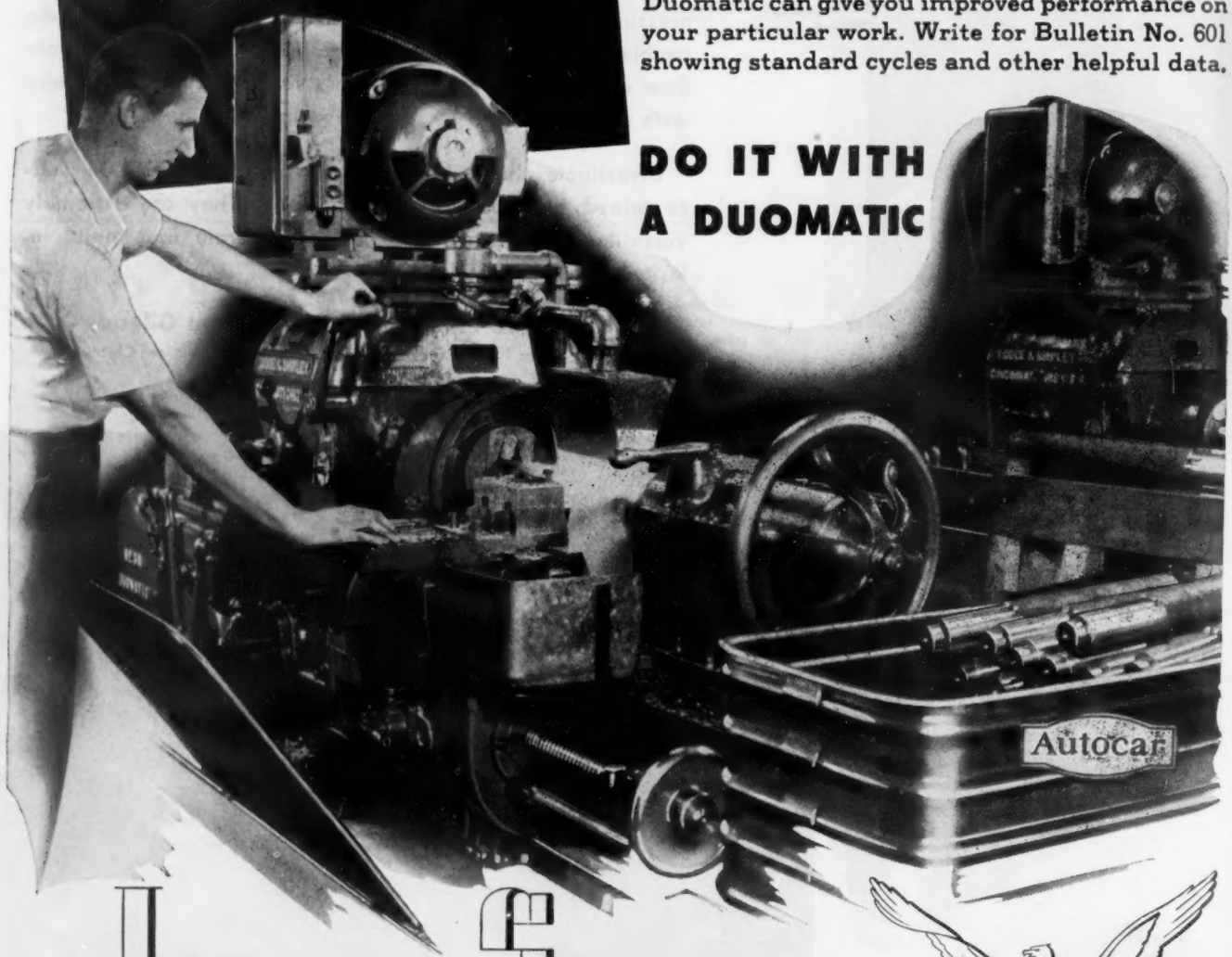
• **Men responsible for greater output of Autocar's famous heavy duty trucks, are convinced of the unusual efficiency of Lodge and Shipley's full automatic lathe—the Duomatic. Here is what these production-minded men have to say about Duomatics they recently installed:**

"Our transmission mainshafts are finished in four operations—two roughing and two finishing. The combined floor-to-floor time of these four operations is approximately 18 minutes. We previously used engine lathes on this part. Now, with our new Duomatics, we show a production increase of 250% over the old method."

In shops of every size and type, handling large or small lots, the Duomatic repeatedly demonstrates its amazing efficiency. Dual tool slides—front and rear—operate singly or together . . . are easily swiveled to cut from any angle. All movements and set-ups are entirely mechanical.

Have Lodge and Shipley Engineers show how the Duomatic can give you improved performance on your particular work. Write for Bulletin No. 601 showing standard cycles and other helpful data.

DO IT WITH A DUOMATIC



THE LODGE & SHIPLEY MACHINE TOOL CO

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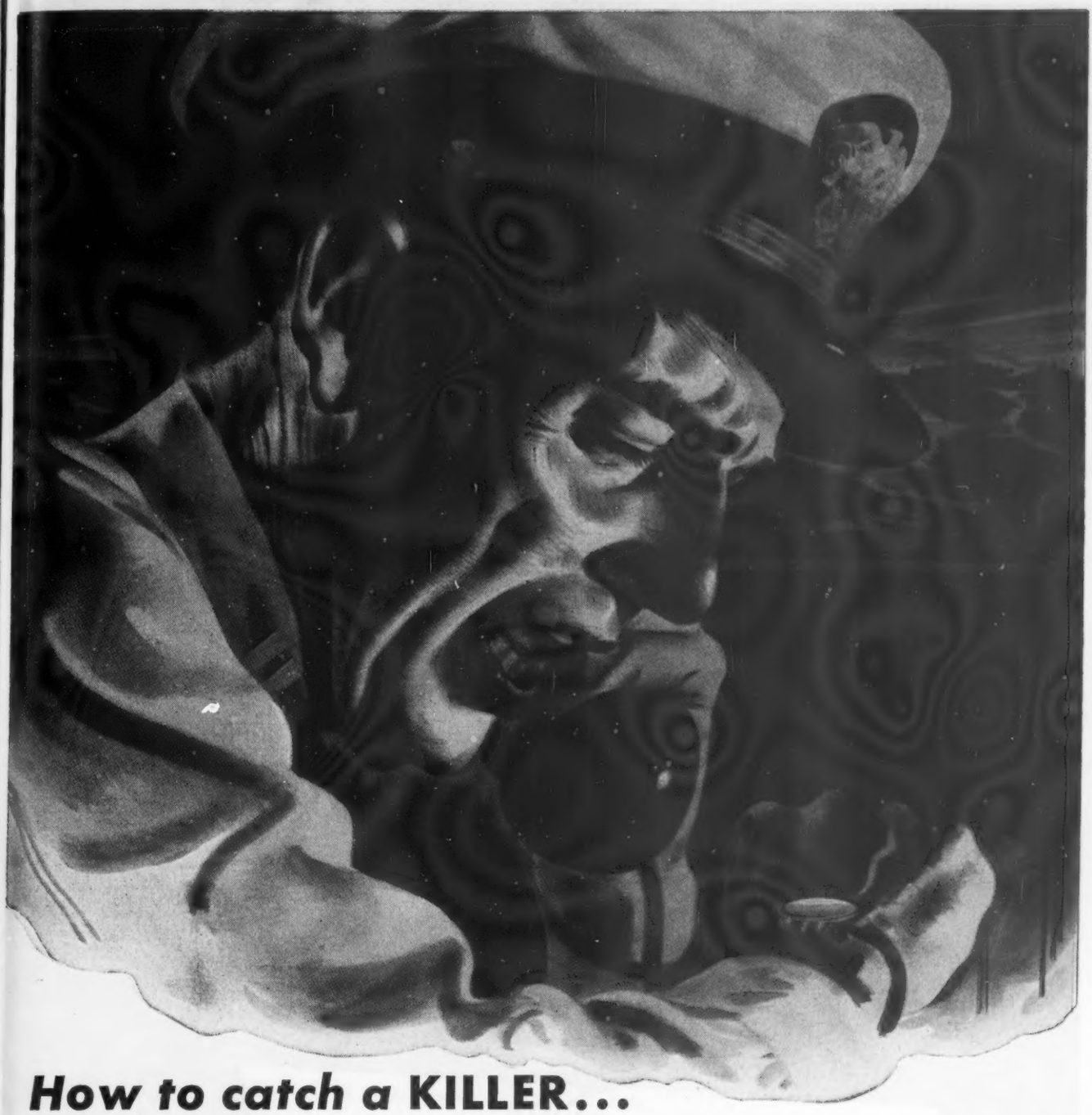
L & S LATHES

ENGINE—TOOL ROOM—AUTOMATIC—OIL COUNTRY LATHES



How to catch a KILLER...

day after tomorrow, at exactly 2120 hours

When an enemy raider is located hundreds of miles away, a course is laid to intercept it at a certain time, at a definite point on the map. Then having once spotted the enemy, Navy navigators keep a "running fix" on him. At the same time, they fix their own position . . . in relation to his . . . by allowing for wind and drift, *and by counting every turn of their ship's propellers*, as the turns are recorded by revolution-counting devices geared to the propeller-shafts.

These counting devices are mounted both in the wheelhouse, and on the engine-room gauge boards. And they are part of the equipment of every Naval and merchant ship . . . because they supply the basic data in the dead-reckoning of a ship's position by showing the number of shaft-revolutions made (which means distance travelled) in any given length of time. Many of these devices are made here, in The Counting House of Industry . . . made with the knowledge that on their accuracy lives, battles, and cargoes may well depend.

The Counting House of Industry

VEEDER-ROOT INC.

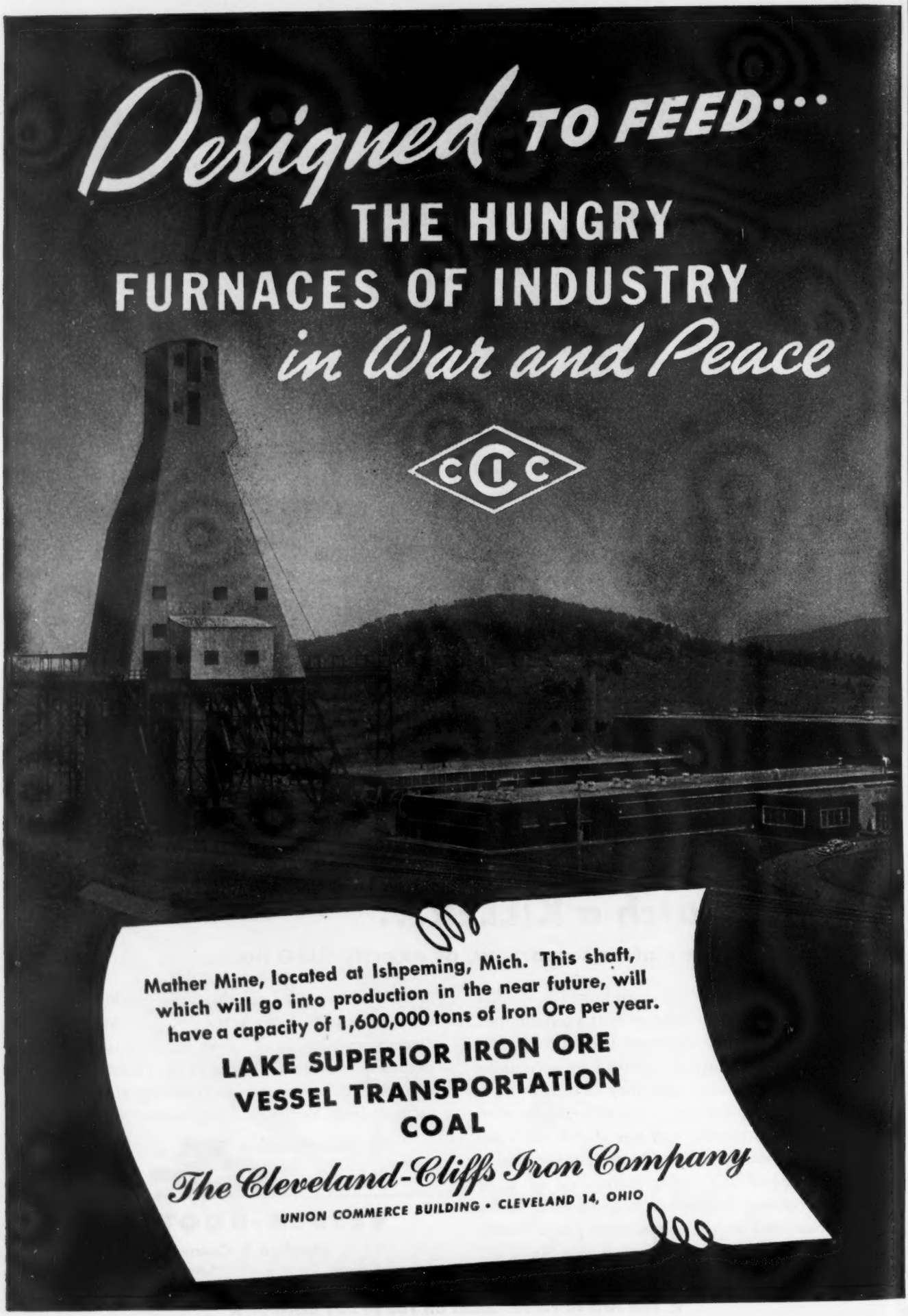
Hartford 2, Connecticut

In Canada: Veeder-Root of Canada, Ltd., Montreal
In England: Veeder-Root Ltd. (new address on request)

★ The Armed Forces Count on *You* to BUY BONDS! ★

Designed TO FEED···

THE HUNGRY FURNACES OF INDUSTRY *in War and Peace*



Mather Mine, located at Ishpeming, Mich. This shaft, which will go into production in the near future, will have a capacity of 1,600,000 tons of Iron Ore per year.

LAKE SUPERIOR IRON ORE
VESSEL TRANSPORTATION
COAL

The Cleveland-Cliffs Iron Company

UNION COMMERCE BUILDING • CLEVELAND 14, OHIO

WHERE CAN YOU USE AIMING MUSCLES

Like Those on the B-29?

The G-E amplidyne promises to step up accuracy and speed of position control on a wide range of peacetime equipment—just as it has on combat aircraft

PROBABLY you've never aimed the guns on a B-29. If you had, we think you'd still be talking about the uncanny way that the guns, though remotely located, turned and dipped, following every move of the sight. The "muscle" which makes possible this control, which responds instantly, smoothly, and with absolute precision, is the G-E amplidyne.

The opportunities for you to apply this unique remote-control "muscle" to industrial machines are a lot greater than you might think!

On power shovels and hoists, for example, amplidyne control is already enabling operators to manipulate heavy loads far faster than they could with any conventional control. Here the amplidyne provides quicker acceleration and deceleration, and assures smoother, safer application of power. Similarly, on steering mechanisms, feed mechanisms, machine tools, and other equipment, the amplidyne affords a faster acting, more accurate link between the operator and his machine.

Bulletin GEA-4053A tells how the amplidyne can be teamed up with such position-detecting "eyes" as selsyns, phototubes, and limit switches to give manually controlled or automatic (as in the case of arc-furnace electrodes) positioning. It shows, too, how the amplidyne simplifies maintenance by "streamlining" control circuits and eliminating many heavy-current carrying contactors. May we send your copy? *General Electric Company, Schenectady 5, N. Y.*

HOW THE AMPLIDYNE WORKS ON THE B-29

The diagram above shows, simply, how the G-E remote-control system works to control guns in elevation. Another amplidyne and a set of position-indicating devices provide similar azimuth control.

Assume that the gunner raises his sight. Immediately, there is a "difference" between the elevation transmitter and receiver, which results in a minute electric signal. This signal is first amplified electronically, and then is instantly magnified again by the amplidyne into "working power" which energizes the turret-drive motor, causing it to turn. As the guns come into position, the signal fades out, and the motor stops.

Although there are several electrical "steps" involved, the response of the guns is practically instantaneous. So smoothly do the guns follow the sight, you'd think guns and gunner are one.

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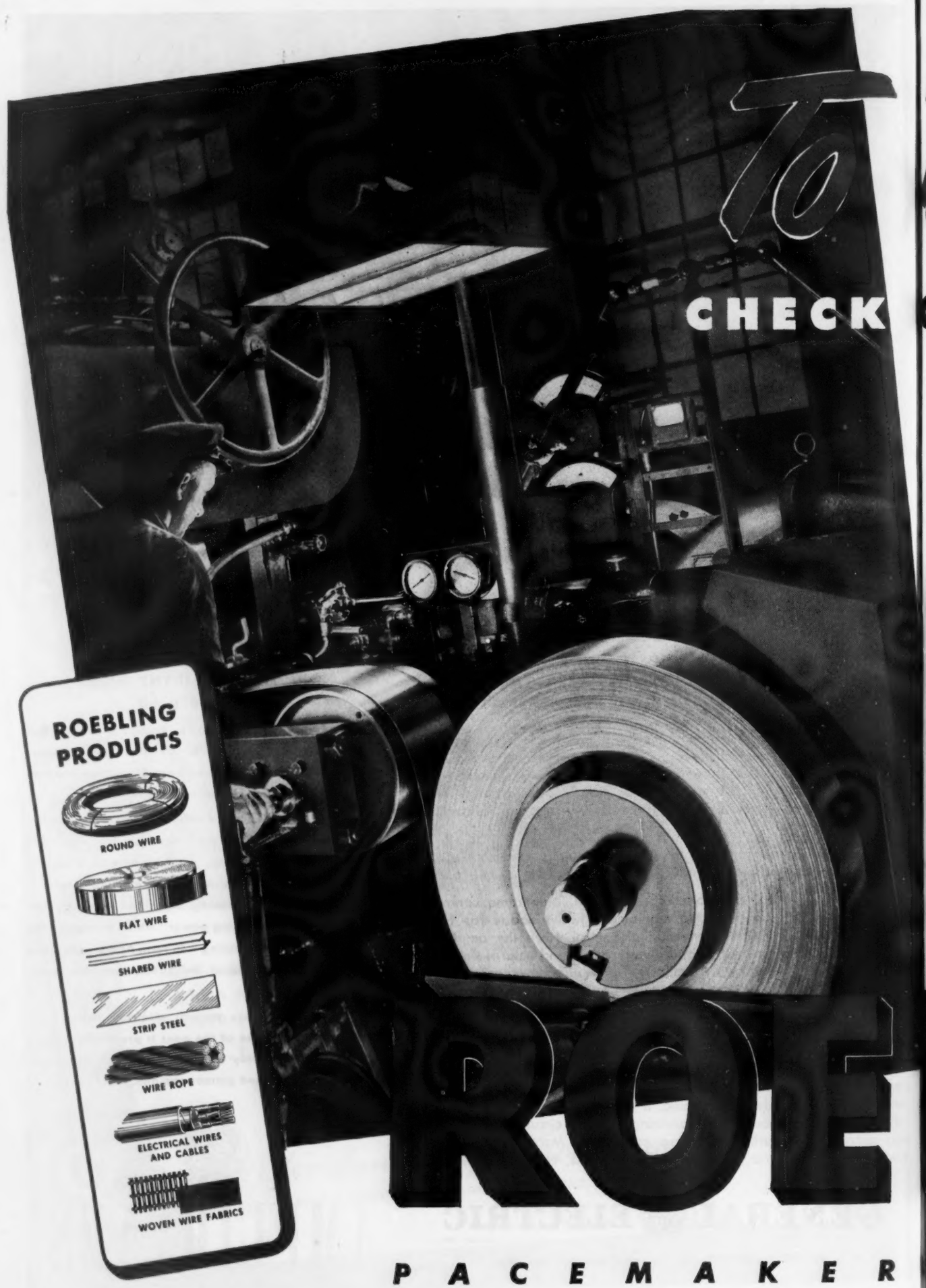
750-250-5965

Buy all the BONDS you can—*and keep all you buy*

AMPLIDYNES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PRODUCTS
ROUND WIRE
FLAT WIRE
SHARED WIRE
STRIP STEEL
WIRE ROPE
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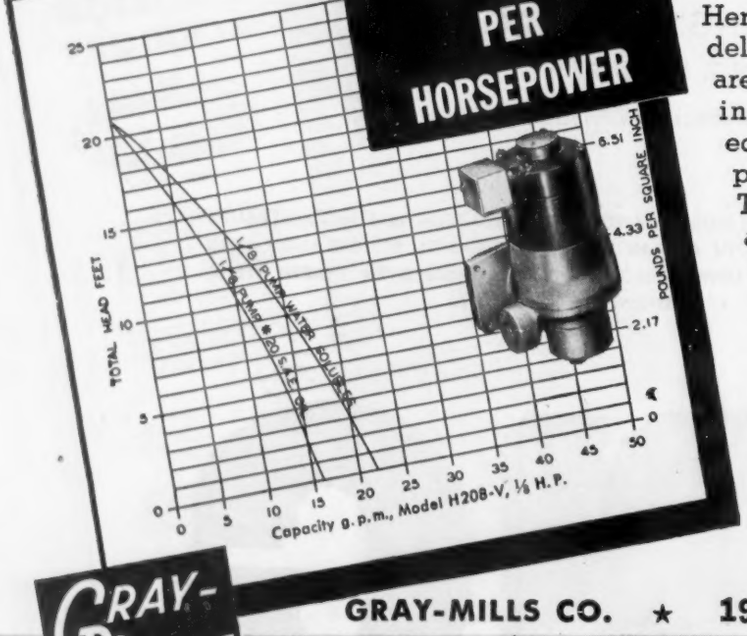

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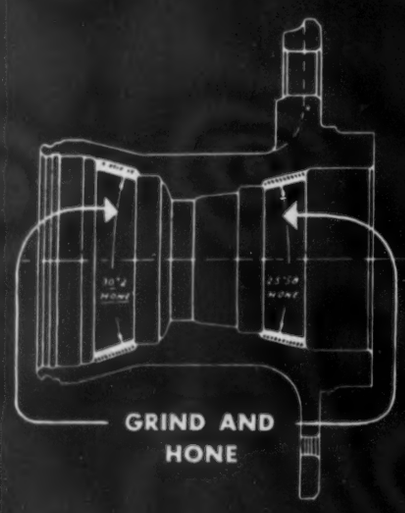

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WRITE FOR IT.. The chart is plastic spiral bound to open flat. Closes to file size. Has a strong hanger for wall use. A copy will be sent to any engineering or production executive who requests it on a business letterhead. Write to Parker-Kalon Corp., 210 Varick Street, New York 14, N. Y.

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On the drafting board, or on the assembly line, this new "Users' Guide" will tell you *at a glance* WHAT TYPE of Parker-Kalon Self-tapping Screw to use . . . WHERE and HOW to use it.

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You are shown the type of hole, the size of hole, the drill size that is best for the different screw sizes and for different conditions. Other tables give you screw sizes, recommended depth of penetration, head dimensions. Also included are tables of decimal equivalents; details on special screws and head styles; practical production hints on the use of Self-tapping Screws.

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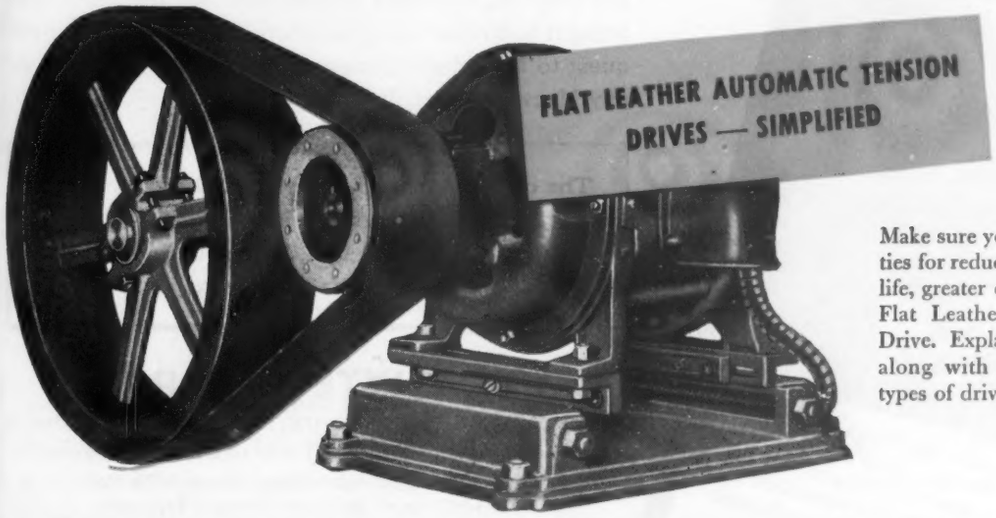

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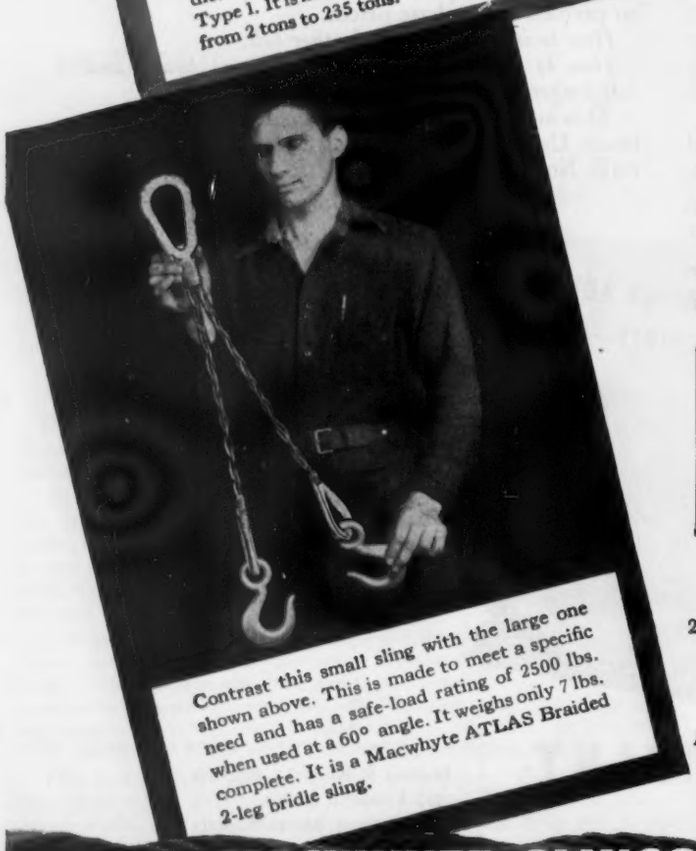

Contrast this small sling with the large one shown above. This is made to meet a specific need and has a safe-load rating of 2500 lbs. when used at a 60° angle. It weighs only 7 lbs. complete. It is a Macwhyte ATLAS Braided 2-leg bridle sling.

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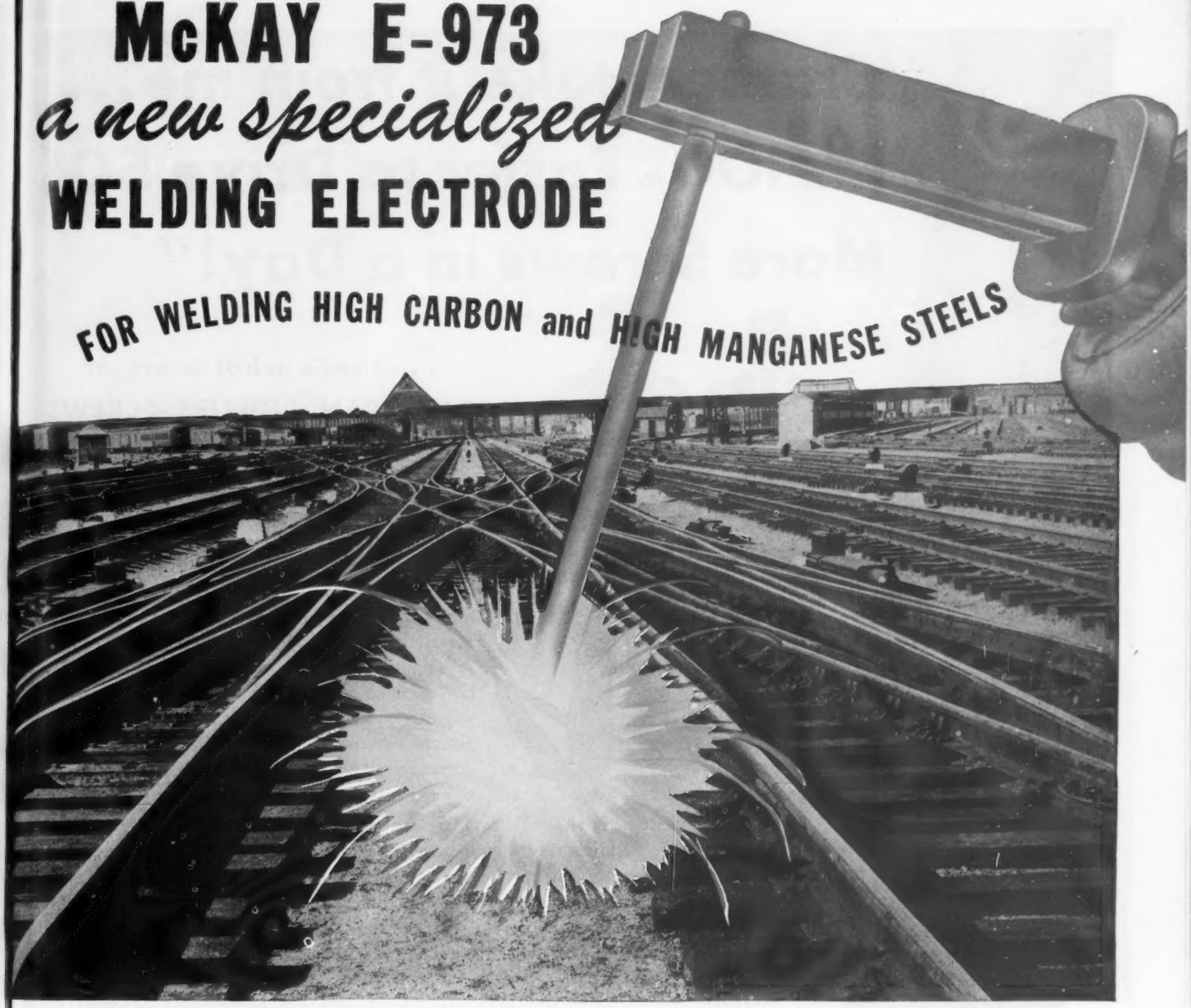

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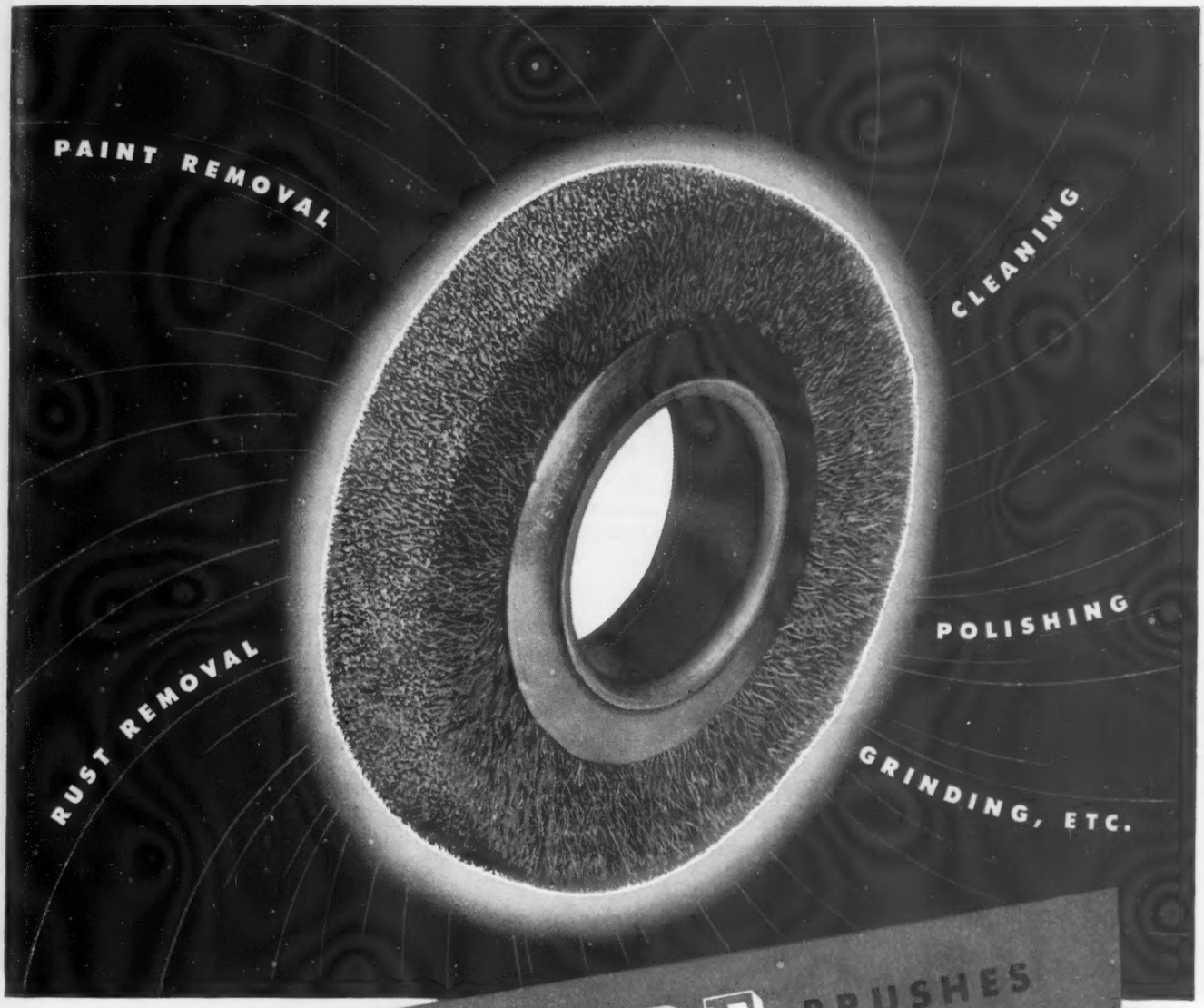

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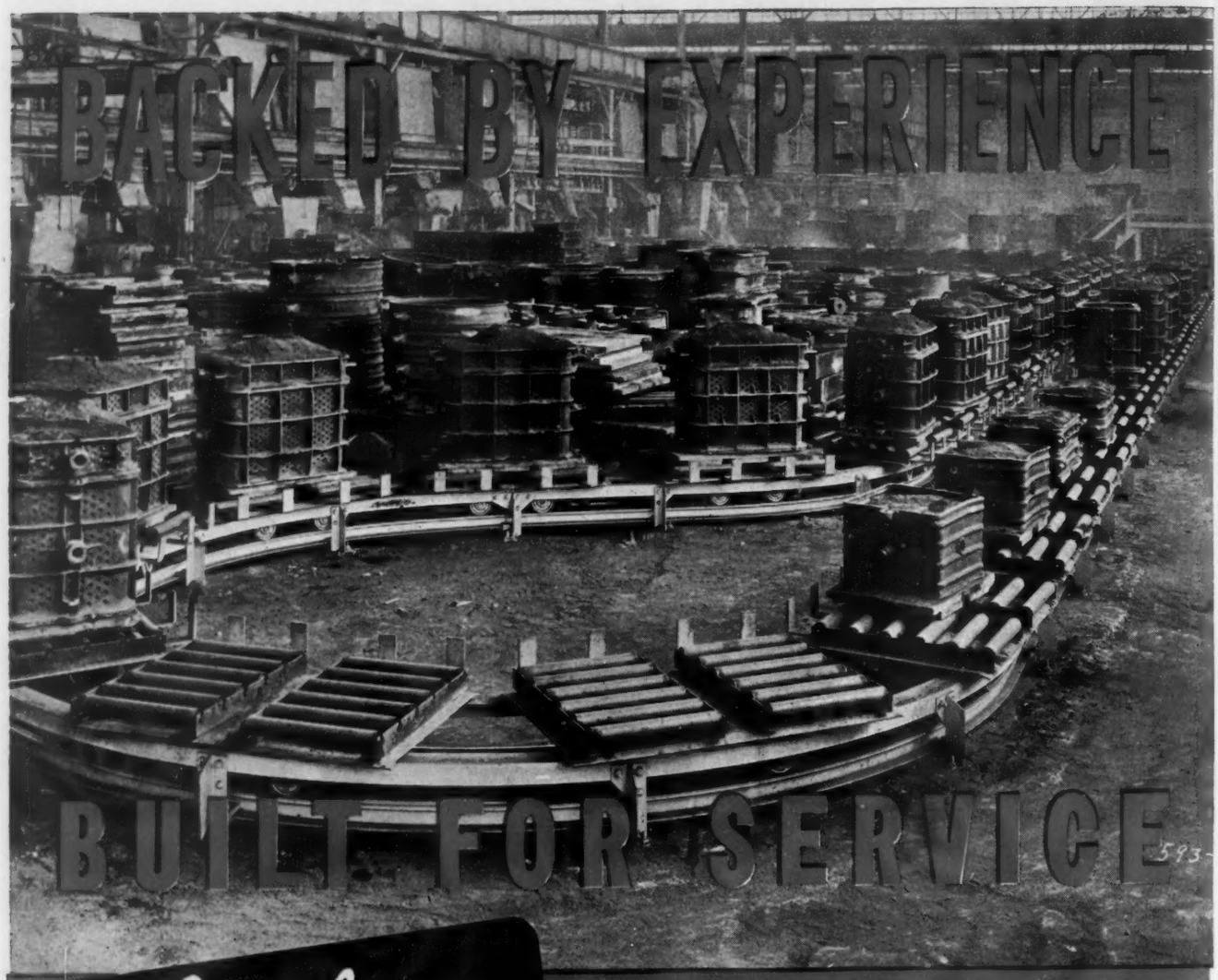

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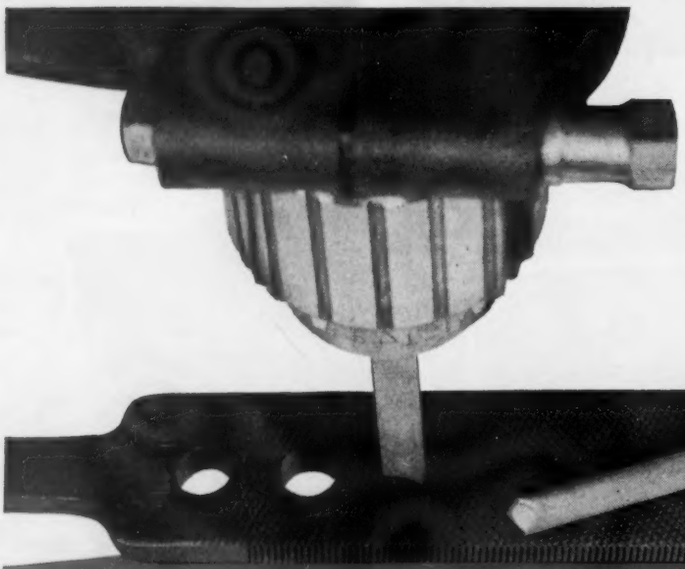

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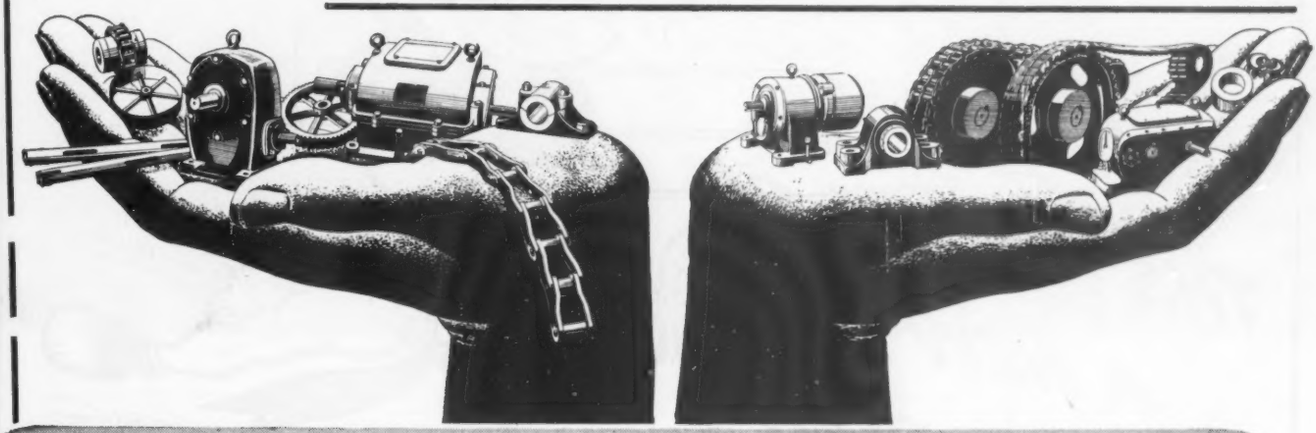

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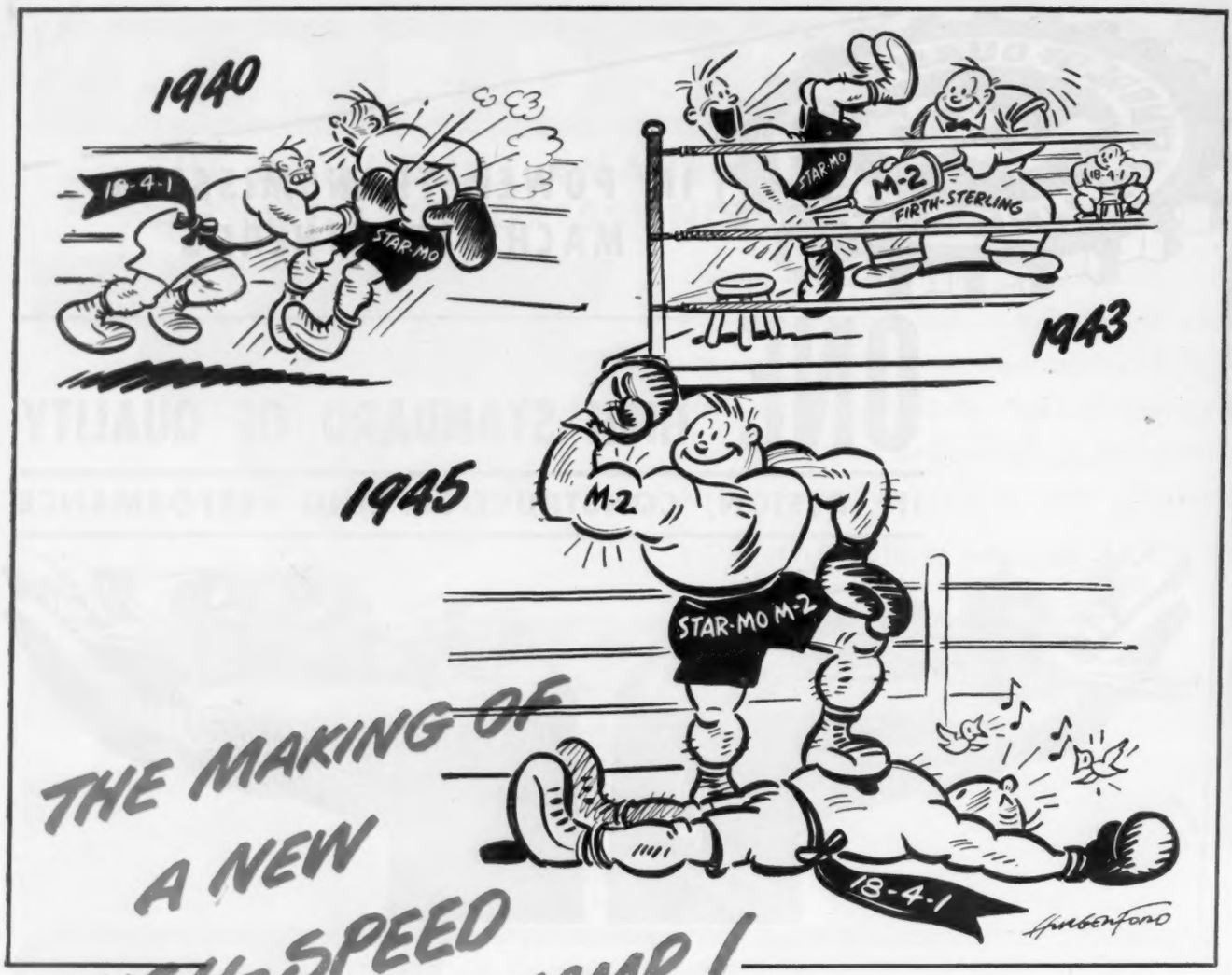

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Remember *your* introduction to Brass? As a boy perhaps, in a manual training class . . . or possibly on the bench of your home workshop. Wherever it was, you realized then that the yellow metal was not only royal in appearance, but that it was a *workable* metal, too.

It seems that Brass was especially made to be machined and worked and formed into so many useful things that people need—thanks to copper-alloy metallurgy that has developed a variety of Brasses with properties that manufacturers find so indispensable: Brasses that can be worked hot or cold, that can be forged, rolled, spun, stamped, pressed, coined, upset or drawn; Leaded Brasses that machine at top spindle speeds . . . ductile Brasses that could be formed or shaped with the pressure of your fingers . . . or hard spring Brasses that can be stressed through millions of cycles without danger of failure by fatigue.

Brass, and a host of other copper alloys, are needed elsewhere now. But with peace

(continued on next page)

ANACONDA

Anaconda Copper & Copper Alloys

Planning for Postwar Markets?

weigh carefully the advantages of Copper, Brass and Bronze

(continued from preceding page)

these metals will return, presenting both an opportunity and a challenge . . . the opportunity to build more serviceable, longer-lasting products for our postwar needs . . . and the challenge to manufacture them at low cost—to be sold competitively, and at a profit.

When redesigning or retooling for these postwar products, take advantage of the manufacturing economies that Copper, Brass, Bronze and Nickel Silver have to offer. These strong, tough, workable metals make possible increased life for punches, dies and forming tools on press work; longer runs and less down-time for tool regrinding on screw machines; greater uniformity of parts; low-cost brazed, soldered or welded assemblies; and a non-rust base for enameled, lacquered or plated finishes.

The American Brass Company produces Anaconda Copper, Brass, Bronze, Nickel Silver and special Copper Alloys in practically all commercial forms—plates, sheets, strips, wire, rod and tubes; special extruded, rolled and drawn shapes; hot pressed forgings and pressure die castings. Our Technical Department will assist you in every way possible to determine the "one best metal" and its most practical form for the job you have in mind.

45153

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut
Subsidiary of Anaconda Copper Mining Company
In Canada: ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

ANACONDA

Anaconda Copper & Copper Alloys

Announcing

THE G-E ARMOR-CLAD

ELECTRODE HOLDER

(Cat. No. 279X17)

ELECTRODE SLOT
holds electrode firmly at proper angle

ALUMINUM SHEATH
protects insulation and resists weld spatter

PUSH-UP ROD
A slight twist of the hand tightens electrode, gives a firm "cushion grip." Threads do not carry current

HANDLE
is light in weight and comfortable to the grip. A twist of the handle releases electrode

SOLDERED CABLE CONNECTION
assures good electrical contact, resulting in a cool handle

- ★ **COMPLETELY INSULATED**
- ★ **WEIGHS ONLY 15 OUNCES**
- ★ **COOL AND COMFORTABLE**
- ★ **EASY TO OPERATE**
- ★ **ACCOMMODATES ELECTRODES UP TO ¼ IN.**

HERE is an electrode holder *designed from the operator's point of view.* It is light in weight, fully insulated, and *amazingly cool in operation.* It is small, compact, easy to use—and so precisely balanced that operator fatigue is materially reduced. Electrodes can be changed by a slight twist of the hand—and electrodes can be melted down to a short stub end without gumming the holder with spatter.

The head of the holder is completely enclosed in a sheath of aluminum armor to protect the insulation and eliminate danger of accidental contact with the welding circuit. Spatter won't stick to this aluminum sheath—the holder stays clean, lasts longer.

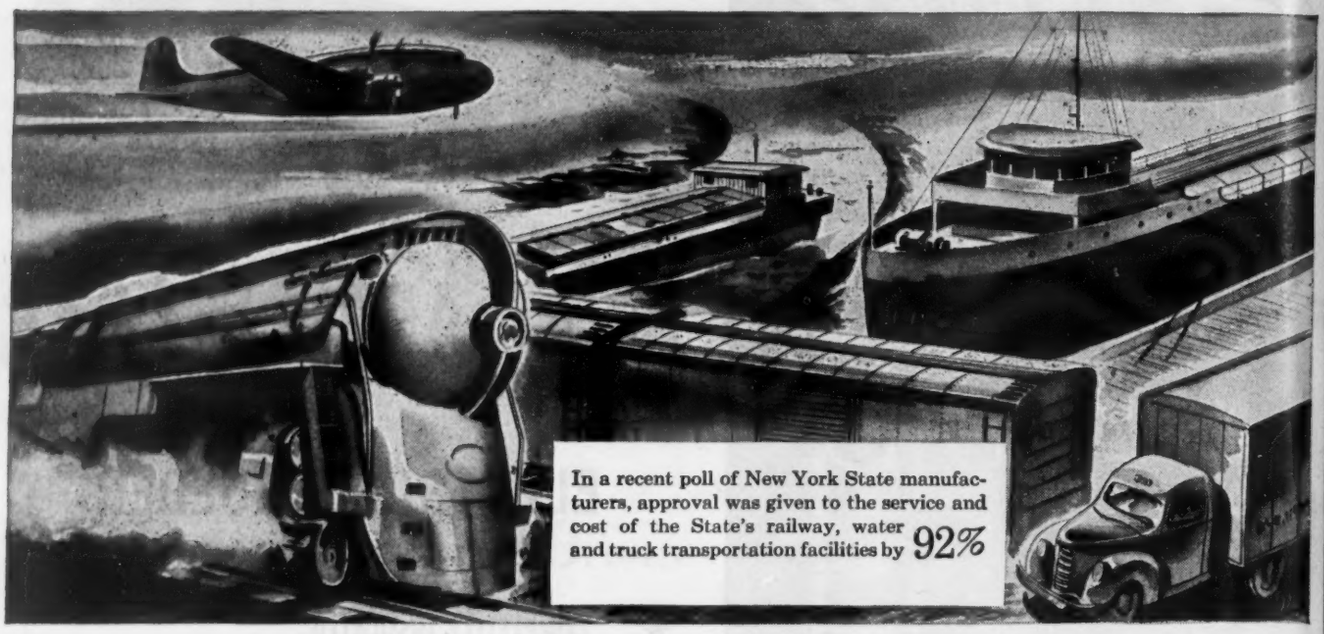
With all of these advantages, the new G-E Armor-Clad holder costs no more than conventional types. Order one today and let *your own operators* judge its ease of operation—and *you* judge its over-all economy. Simply contact your G-E arc-welding distributor, or write to General Electric Co., Schenectady 5, N. Y.

Buy all the BONDS you can—and *keep all you buy*

GENERAL ELECTRIC

672-80-9748

NEW YORK'S GREATER TRANSPORTATION FACILITIES HELP BUSINESS EARN GREATER PROFITS


In a recent poll of New York State manufacturers, approval was given to the service and cost of the State's railway, water and truck transportation facilities by 92%

You, as a businessman looking forward to brighter horizons and more profitable marketing in the postwar period, cannot afford to overlook these positive straightforward facts.

• New York's unexcelled and highly diversified transportation system means two things to *you*, Mr. Businessman, and they are all-important.

First, in New York you have at your fingertips all the facilities for distribution to the nation's richest and most highly concentrated markets—those of the entire Eastern Seaboard. And you can reach them quickly, at low cost!

Second, through New York's pre-eminence as a center of world wide transportation, all the potentially unlimited postwar markets of the entire world are within your reach.

Specifically, Mr. Businessman, here are the complete transportation advantages you enjoy in the Empire State:

By Rail . . . You have 41 railroads within the State rendering efficient service to every village. 10 major lines provide fast freight and express passenger service to key cities of the nation.

By Water . . . You have regular, low-cost service on more than 900 miles of navigable rivers and canals. You have strategically located Great Lakes Ports and through the great Port of New York you have the means of moving goods to and from every port in the world.

By Highway . . . You have one of the most modern systems for motor vehicle transportation in the world. Over it, thousands of trucks move daily on both long and short hauls—and with liberal size and weight allowances.

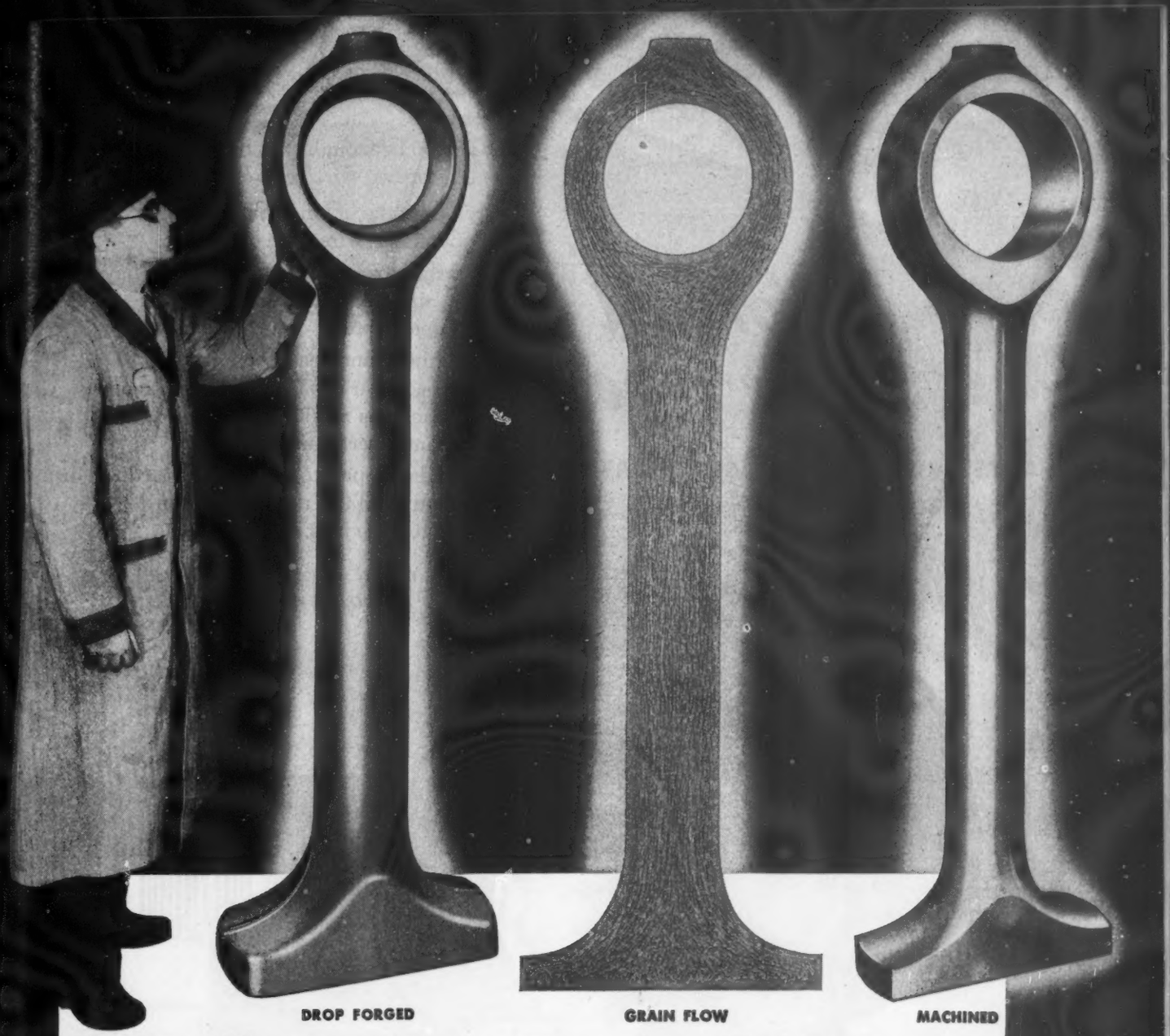
By Air . . . . . You have the nation's most strategic location on the air routes of the world with five major lines serving the State, the nation, and much of the world.

Accept This Informative Book

The New York State Department of Commerce offers assistance to you in planning your postwar expansion. The services we can render are fully described in our new book "New York Means Business." In it businessmen tell in their own words their experience with labor, transportation, markets and other factors of doing business in New York. Send for your copy on your business letterhead.

ADDRESS: M. P. CATHERWOOD
COMMISSIONER
NEW YORK STATE DEPARTMENT OF COMMERCE
ROOM 442, 112 STATE ST., ALBANY 1, NEW YORK

NEW YORK MEANS BUSINESS



DROP FORGED GRAIN FLOW MACHINED

New Heavy Drop Forging Techniques

give designers greater latitude

Higher speeds—increased horsepower at no added weight—require higher physical properties...which can be obtained in drop forgings.

Ladish engineers are available now for consultation on your post-war products.

DROP FORGINGS UP TO 2500 LBS.

TO MARK PROGRESS

LADISH DROP FORGE CO.

CUDAHY • WISCONSIN

MILWAUKEE SUBURB

Preformed wire rope

CUTS PRODUCTION COSTS 3 WAYS

One reason is enough—but here are *three* reasons why Preformed wire rope cuts production costs:

1. Preformed lasts longer; pays bigger dividends on wire rope dollars.
2. Preformed rotates less. You don't have to repair or replace sheaves, drums and rope so often.
3. Preformed winds easily on drums. You encounter fewer delays. Your men and machines produce more per day, per month, per year.

Thousands of operators have standardized on Preformed—and use nothing else on tough wire rope jobs.

ASK YOUR OWN SUPPLIER FOR PREFORMED WIRE ROPE

2 Reasons why

RED LEAD

means Extra Rust Protection . . .

Why is Red Lead so widely accepted throughout industry as *The* metal protective paint?

Why are paints containing Red Lead so generally specified for safeguarding metal surfaces from the costly ravages of rust?

The reasons are many, but none are more noteworthy than Red Lead's ability to counteract acid conditions and to halt electrochemical action—both prime causes of rusting—as explained at right.

Still another important advantage of Red Lead is that it partially combines with the usual vehicles to form compounds generally known as "lead soaps." Due to their composition and the individual way in which these compounds form, the film obtained is highly water-resistant. In addition, lead soaps contribute to the formation of tough, elastic films that "stick on the job."

Remember, too, that Red Lead is compatible with practically all vehicles commonly used in metal protective paints, including phenolic and alkyd resin types.

Specify Red Lead for ALL Metal Paints

The value of Red Lead as a rust preventive is most fully realized in a metal paint where it is the only pigment used. However its rust-resistant properties are so pronounced that it also improves any multiple pigment paint. No matter what price you pay, you'll get a better metal paint if it contains Red Lead.

NEUTRALIZES ACID

1 Red Lead has the ability to counteract acid conditions which are recognized as accelerators of rust. Structural steel is exposed to such environments because acid forming compounds are carried by the atmosphere in the form of gas, smoke and moisture. Red Lead has a neutralizing effect on these conditions as it is essentially a *basic* pigment with the ability to develop and maintain, for a prolonged time, a mild alkaline environment at the surface of the metal. Authoritative tests show that, as a result, Red Lead inhibits the process of corrosion. In short, metal paints, too, should "stay on the alkaline side."

2 Another outstanding reason Red Lead means *extra* rust protection is the unique way it shields metal surfaces with a protective film. Rusting is fundamentally an electrochemical process in which weak currents are generated which cause iron to become soluble in the lowest state of oxidation. Red Lead has properties through which this iron is rapidly converted to a stable compound that forms an adherent film. The formation of this protective shield halts electrochemical action, thus preventing further corrosion.

Write for New Booklet

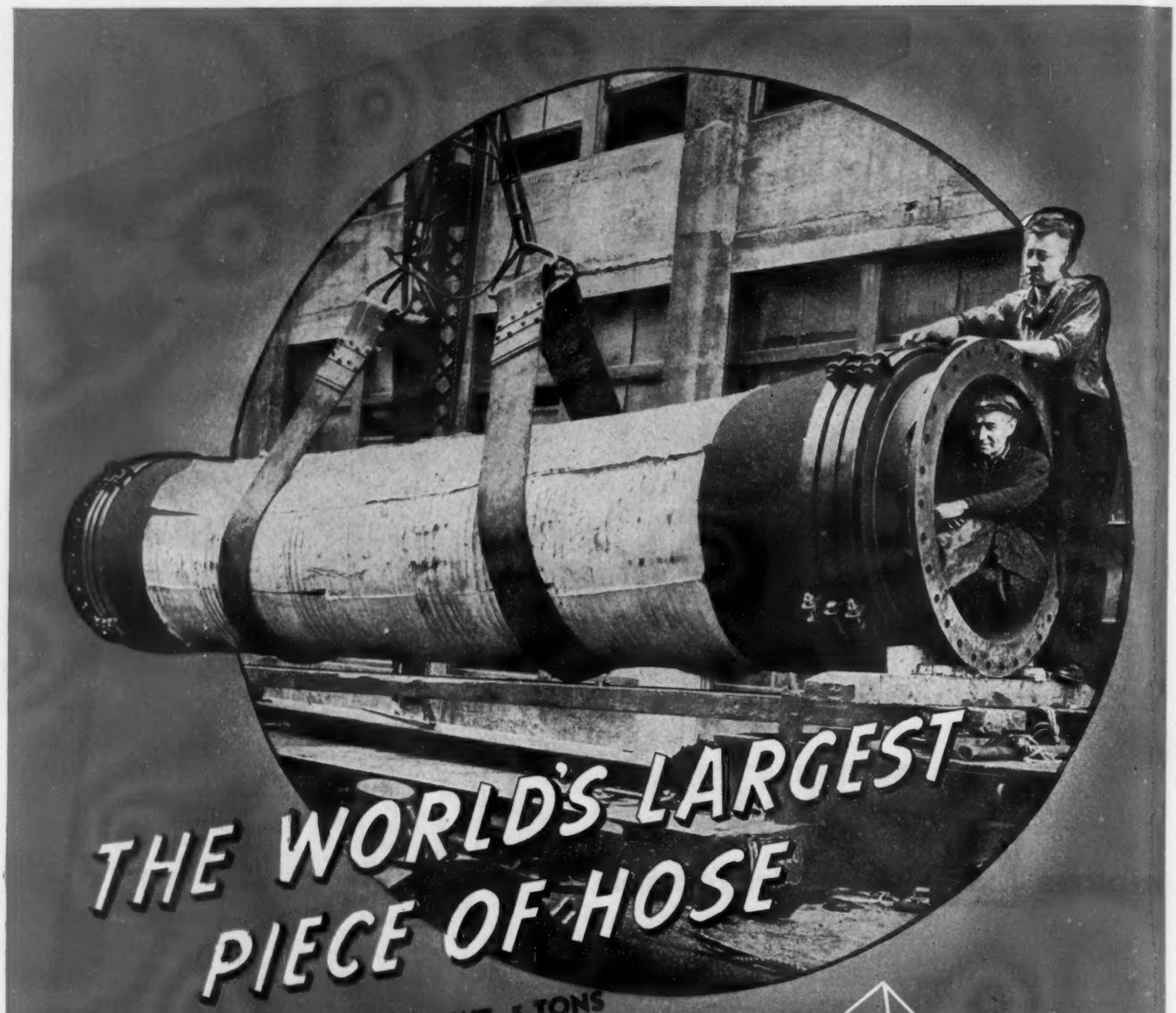
"Red Lead in Corrosion Resistant Paints" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel. It describes in detail the scientific reasons why Red Lead gives superior metal protection. It also includes typical specification formulas. If you haven't received your copy, address nearest branch listed below.

* * *

The benefit of our extensive experience with metal paints for both underwater and atmospheric use is available through our technical staff.

NATIONAL LEAD COMPANY: New York 6, Buffalo 3, Chicago 10, Cincinnati 3, Cleveland 13, St. Louis 1, San Francisco 10, Boston 6 (National-Boston Lead Co.); Pittsburgh 30 (National Lead & Oil Co. of Penna.); Philadelphia 7 (John T. Lewis & Bros. Co.)

DUTCH BOY RED LEAD



THE WORLD'S LARGEST PIECE OF HOSE

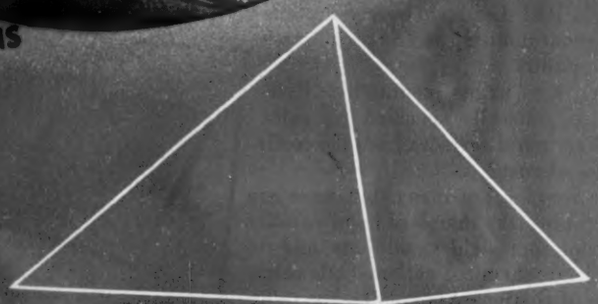
38" I. D. 20 FT. LONG WT. 5 TONS

More than 30,000,000 cubic yards of Mississippi River bottom have already passed through this hose.

This amount of material would make 10 pyramids, each as large as the Great Pyramid of Egypt

It would fill a trench two yards wide and two yards deep that would reach from Boston to Los Angeles.

This piece of hose was installed in 1940 as a flexible joint on the suction end of a hydraulic dredge. It is still in use and GOING STRONG!



DIMENSIONS OF GREAT PYRAMID

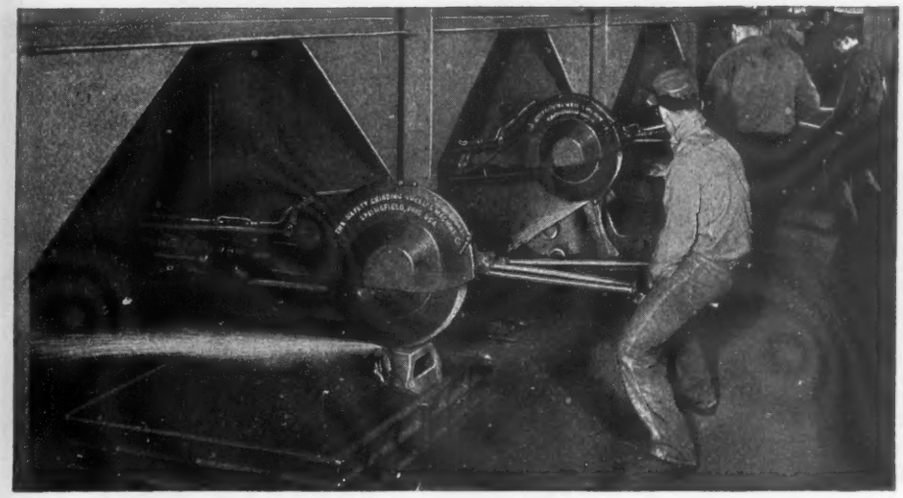
Base: 750 ft. x 750 ft.
Height: 482 ft.
Contents: 3,041,148 Cu. Yds.

BOSTON WOVEN HOSE & RUBBER COMPANY

WORKS: CAMBRIDGE, MASS., U.S.A. P.O. BOX 1071, BOSTON 3, MASS., U.S.A.

REINFORCE

THE FOUNDRY FORCE WITH SAFETY



SWING FRAME GRINDERS and GRINDING WHEELS

It's like bringing in new reserves, new manpower, when SAFETY DeLuxe Swing Frame Grinders and Grinding Wheels go on the job. With these new reinforcements the grinding of welds and billets, the snagging of castings, and other operations, take on new speed and efficiency. Production flow is more uniform, with less fatigue and, of course, at lower cost.

You may be interested in getting more of the facts about this unbeatable combination of SAFETY Swing Frame Grinders and Grinding Wheels. Or about other SAFETY products designed for more profitable foundry operation. Or about SAFETY'S *free* engineering service for foundries. A wire, phone call, or letter to our factory, or to any of the offices listed below, will get prompt action. No obligations whatsoever!

Other SAFETY Products Include

Grinding Wheels for every purpose
"Rite-Speed" Grinders
Portable Grinders
Floor Stand Grinders

. . .

Ask for Descriptive Booklets

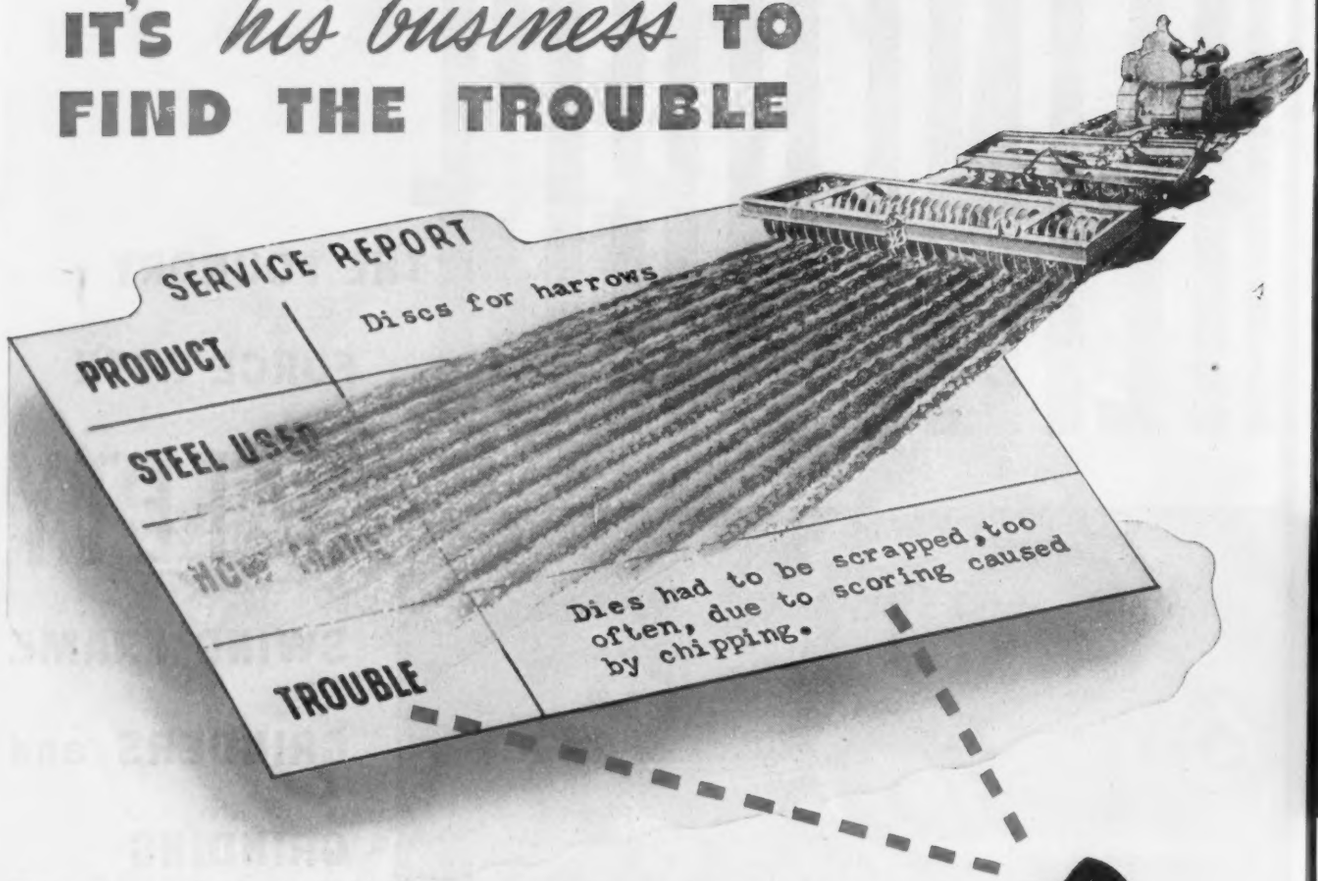
SAFETY GRINDING WHEEL AND MACHINE COMPANY

Main Office and Factory SPRINGFIELD, OHIO, Phone 4651

● Birmingham—3-3323 ★ Chicago—TRiangle 8308 ★ Cleveland—EXpress 1445 ★ Detroit—TOwnsend 8-4740
★ Pittsburgh—ATlantic 5218 ★ Erie—23-093 ★ Philadelphia—WAlnut 3132 ★ St. Louis—CEntral 3676
★ Syracuse—3-2131 ○ Milwaukee—Mitchell 0265 ★ Toledo—MAin 6637

● *Sales Offices and* ★*Sales Offices and Warehouses maintained for quick service and deliveries.*

IT'S *his business* TO FIND THE TROUBLE



The discing of the land is an important step in growing the world's food supply. The making of these discs is equally important to those whose business it is to manufacture them as economically as possible.

What has this to do with Latrobe's Metallurgical Service? Simply this: Recently, a manufacturer was confronted with a problem that involved the dies from which such discs were made. The discs were carbon steel, in the "as rolled" state, .90 to .158 thick. The dies were 18" O.D. x 16" I. D. x 4" thick. These dies were failing because of sinking, and the resultant chipping scored the dies full length, making it necessary to scrap them.

A Latrobe *Service Engineer* was called to help. After a comprehensive study of all conditions, he decided to recommend a die steel of higher compressive strength and greater toughness. The result—*25,000 pieces per grind* instead of 7,000 pieces—*and the die still in excellent condition.*

* * *

This is a typical instance of the kind of help Latrobe's Service Engineers are anxious to render to any customer. It's the business of these skilled men to know where to look for trouble . . . and what to do about it! It's a service Latrobe renders without cost, so that the products you make can be produced more efficiently and economically.

Write us your problem—and we'll be glad to supply the answer.

Latrobe ELECTRIC STEEL COMPANY

MAIN OFFICES *and* PLANT — LATROBE · PENNSYLVANIA

LESCO

HIGH SPEED STEELS · DIE STEELS · TOOL STEELS · STAINLESS

LATROBE RED ARROW for metal-cutting tools

S-1

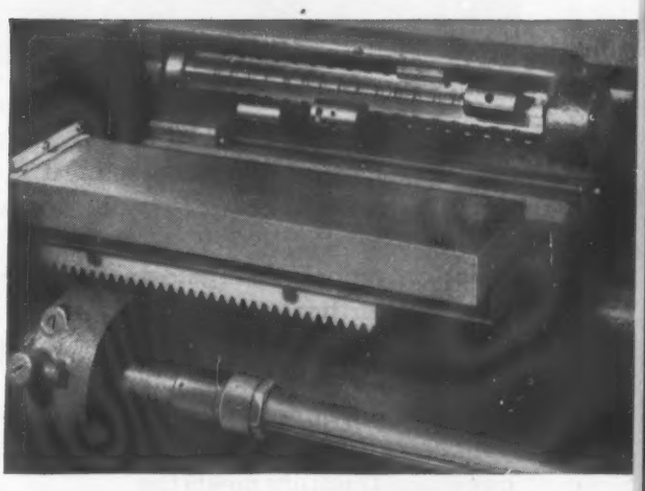
LATROBE *Metallurgical Service*

where the "HARD" way

is the RIGHT way!

There is no substitute for *hard* steel on the ways of a turret lathe. That's why Gisholt does it *right* . . . makes its bedways of steel, hardened to 64-66 on the Rockwell C scale.

That's why Gisholt's ways can't be battered by heavy work or scored by hard, tough chips. Straddle-keyed their entire length, bolted to bedways from the under side, and finish-ground in exact alignment with the spindle, Gisholt's hardened-steel ways provide bearing surfaces that are virtually wear-proof. They insure the high standard of accuracy for which Gisholt is known —and maintain it through long years of service.



Gisholt's thick, block-type ways are hardened on all surfaces: (1) top *to support weight of carriages and cutting pressure of tools,* (2) both sides *for alignment and gibbing, and* (3) *for* bottom *gibs and clamps. Automatic pressure lubrication eliminates any tendency to wear, even in areas of heaviest carriage travel.*

GISHOLT MACHINE COMPANY

1217 East Washington Ave. • Madison 3, Wisconsin

Look Ahead . . . Keep Ahead . . . With Gisholt Improvements in Metal Turning

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SPECIAL MACHINES

ELECTROLYTIC tinplate is a wartime necessity that has made good. It is, in fact, the tinplate of the future---here today and here to stay.

Not only does Youngstown Electrolytic Tinplate save critical tin; it is an improved product. More than ten years' research and experience have gone into its development. Tin coating can be much thinner than with hot dipped plate, yet absolutely uniform in its covering. Ductility meets the fabricator's most severe tests --180° bends, sharp angles, embossing and knurling, curled edges, all without a crack, check or break in the metal.

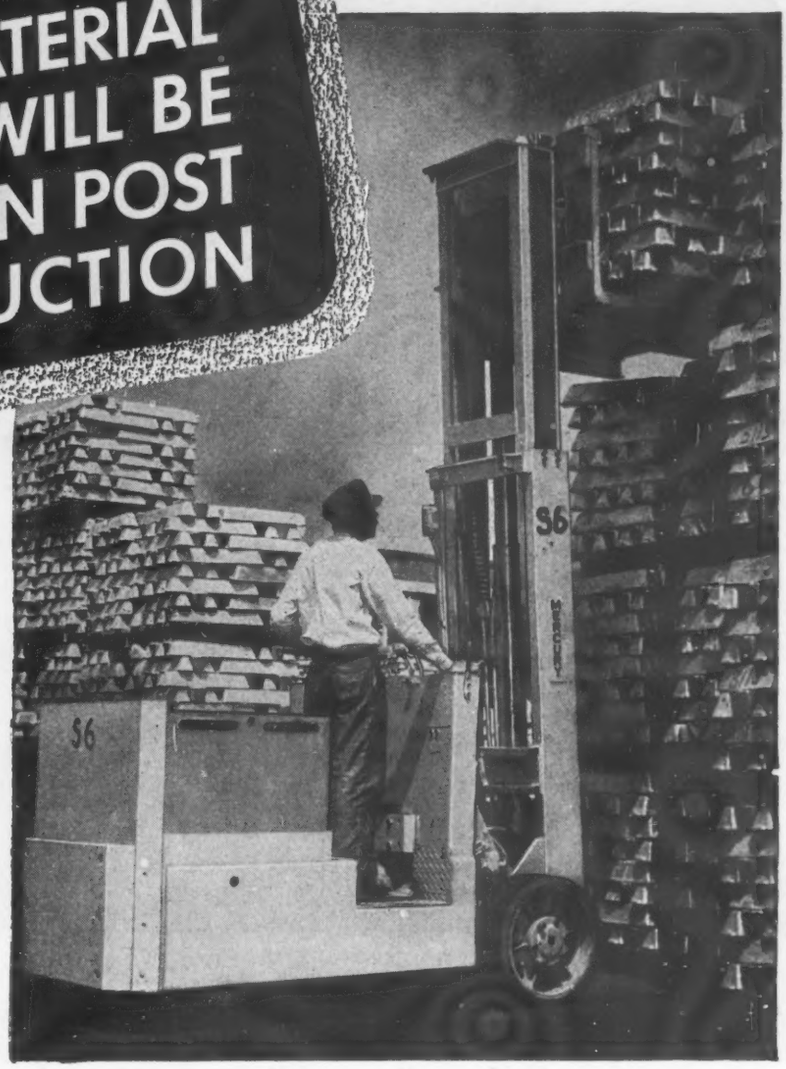
Every order of Youngstown Electrolytic Tinplate is produced to meet the user's needs--literally custom-made for his own lacquer and forming methods and for the particular service for which his cans or caps are made.

Youngstown Electrolytic Tinplate affords maximum protection to foods at lowest cost.

QUALITY TRADE MARK YOUNGSTOWN SERVICE

YOUNGSTOWN
Electrolytic Tinplate
THE YOUNGSTOWN SHEET AND TUBE COMPANY
YOUNGSTOWN, OHIO
Manufacturers of
CARBON, ALLOY AND YOLOY STEELS
Electrolytic Tin Plate-Coke Tin Plate-Pipe and Tubular Products-Sheets-Plates-Conduit-Bars-Rods-Wire-Nails-Tie Plates and Spikes-Alloy and Yoloy Steels.

EFFICIENT MATERIAL HANDLING WILL BE IMPERATIVE IN POST WAR PRODUCTION



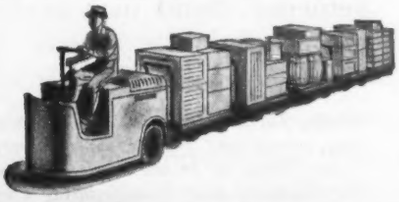
. . . let MERCURY help you plan your system NOW

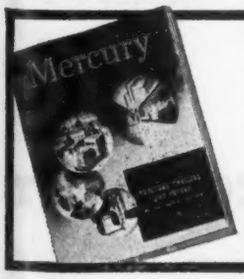
Indications are that keen competition in the post war market will force prices down . . . this in spite of increased labor and materials costs.

One important opportunity for production economy is in material handling. Experience has proved that efficient handling can reduce finished costs as much as 10 to 20%.

Mercury can help you plan an efficient handling system. As pioneer builders of material handling equipment Mercury has the experience and the engineering "Know How" to analyze your specific problems and to recommend solutions. For example, here is the background Mercury has to offer you:

1. Originators of the "Trackless Train" system of materials handling. The fact that thousands of Mercury tractors and many times that number of Mercury trailers are serving throughout industry is evidence of the popularity of the "Trackless Train" system.

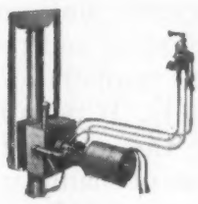




FREE—MERCURY Catalog

Attractively designed. Equipment is illustrated in natural colors and with full specifications. 40 pages of helpful information to the handling executive. Write for your copy.

2. Mercury has pioneered and perfected many important industrial truck features. Those illustrated are standard on all Mercury fork trucks. While these features vary slightly on Mercury platform trucks, the basic principles are the same—

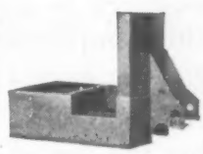


Hydraulic Hoist: No power required to lower load, no power wasted in lifting. Less than 50% of the usual moving parts.

Snap-action cam operated controller: Eliminates injurious arcing. Reduces maintenance to the minimum.

Unit constructed drive assembly: Motor and drive are one unit. Double reduction spiral bevel and spur gears transmit maximum power.

All welded frame: No rivets to weaken sections. Exterior is smooth and pleasing in appearance.



THE MERCURY MANUFACTURING COMPANY
4140 South Halsted Street, Chicago 9, Illinois

THE TRACKLESS TRAIN

MERCURY

TRACTORS TRAILERS • LIFT TRUCKS

An Enameling Improvement ready *now!*

THE Titanium Alloy Manufacturing Company announces a new titanium alloy enameling steel which offers improved quality and reduced cost to the manufacturers of vitreous enameled products.

This new steel has exceptional ductility, being in this respect at least equal to the best deep drawing steels previously known. It also has superior resistance to sagging at enameling temperatures.

Tests conducted in many different laboratories have indicated that the use of titanium alloy enameling steel virtually eliminates primary boiling because of the fact that the carbon in the steel has been stabilized by the titanium. This indicates that ground coat can be eliminated, assuring greater uniformity of finished product and reducing rejects and re-operations very substantially. It permits furthermore the application of lighter coats of enamel with the consequent reduction in cost and improvement in appearance and wearing qualities of many enameled articles.

There are many additional features of interest to both steel producers and manufacturers of enameled products.

A member of our Technical Staff will be glad to go over details with you at your convenience. Send us a card for prompt action.

★ ★ ★

Pending patent applications on the new enameling process and product made thereby are owned jointly by Inland Steel Company and The Titanium Alloy Manufacturing Company under Trust Agreement.

THE TITANIUM ALLOY MANUFACTURING COMPANY

Executive Offices: 111 BROADWAY, NEW YORK, N. Y. *General Offices and Works:* NIAGARA FALLS, N. Y.

CLEANING AND RUST INHIBITING IN ONE OPERATION

with PENNSALT CLEANER EC-10*

Reg. U. S. Pat. Off.

Preparing "blitz cans" for welding presents a tough cleaning problem. Oil and grease must be removed, and the surface must be capable of receiving an even weld without rust from the coolant water used on the welding machine. Penn Salt's technical staff helped this manufacturer of "blitz cans" solve the problem.

A concentration of one part Pennsalt Cleaner EC-10 to 100 parts of water was used in a spray washing machine. This produced a very clean part with sufficient rust protection to last until the subsequent operation. So satisfactory was the result, that Pennsalt Cleaner EC-10 was promptly re-ordered.

How about *your* cleaning problem? Penn Salt's technical staff is at your service without obligation. Acid, Alkaline and Solvent-Type Pennsalt Cleaners are noted for their ability to solve difficult problems quickly, effectively, economically. Write fully to our Special Chemicals Division, Dept. S.

SPECIAL CHEMICALS DIVISION PRODUCTS

Acid-Proof Cements • Alkali-Proof Cements • Lead Fluoborate Concentrates • Fluoboric Acid • Acid, Alkali and Solvent Emulsion Type Cleaners • Paint Strippers.

*Patent Applied for

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

New York • Chicago • St. Louis • Pittsburgh • Minneapolis • Wyandotte • Tacoma

P&H

HEVI-LIFT

HARNISCHFEGER CORP. MILWAUKEE, WIS

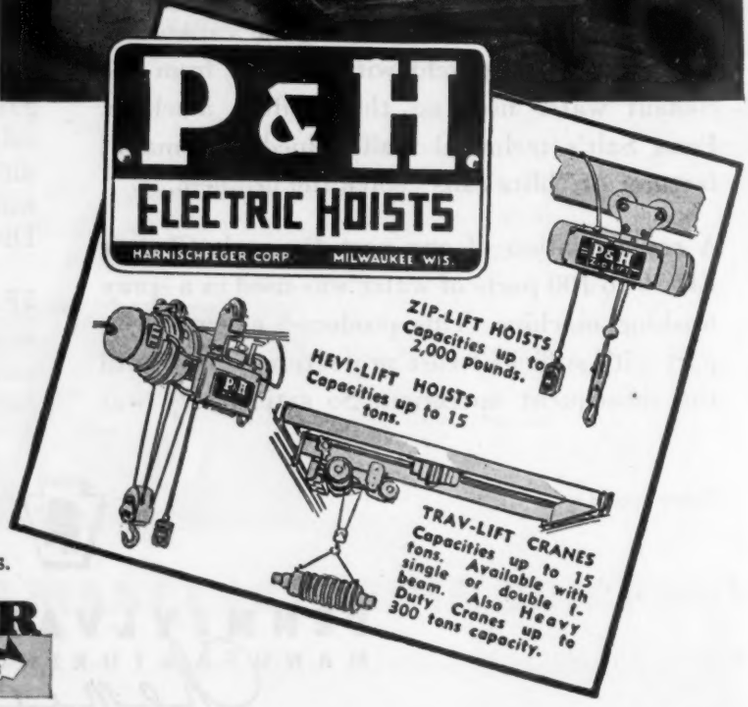
Less HANDLING TIME—

More PRODUCTION TIME

You can't get all the man power you need . . . but you *can* get aid that will enable present workers to do more.

Take the lag and labor out of materials handling . . . the lifting of heavy parts on and off machines . . . the manual handling of materials from one location to another — with P&H Hevi-Lift Hoists. With these modern hoists, workers merely push buttons to lift, convey, lower and place loads — exactly where they are wanted — and without rehandling. Electricity does the work.

P&H Hevi-Lift Hoists conserve workmen's energy — let them work more efficiently, throughout the day. They speed up materials handling . . . lower production costs . . . and eliminate aisle congestion. P&H Electric Hoists can help you today while fast production is so vital — and tomorrow when lower costs will be more important. A P&H Hoist Engineer will be glad to talk over your requirements. Call him in today, or write for new bulletin containing full information.


P&H
ELECTRIC HOISTS
HARNISCHFEGER CORP. MILWAUKEE, WIS.
ZIP-LIFT HOISTS
Capacities up to 2,000 pounds.
HEVI-LIFT HOISTS
Capacities up to 15 tons.
TRAV-LIFT CRANES
Capacities up to 15 tons. Available with single or double I-beam. Also Heavy Duty Cranes up to 300 tons capacity.

General Offices:

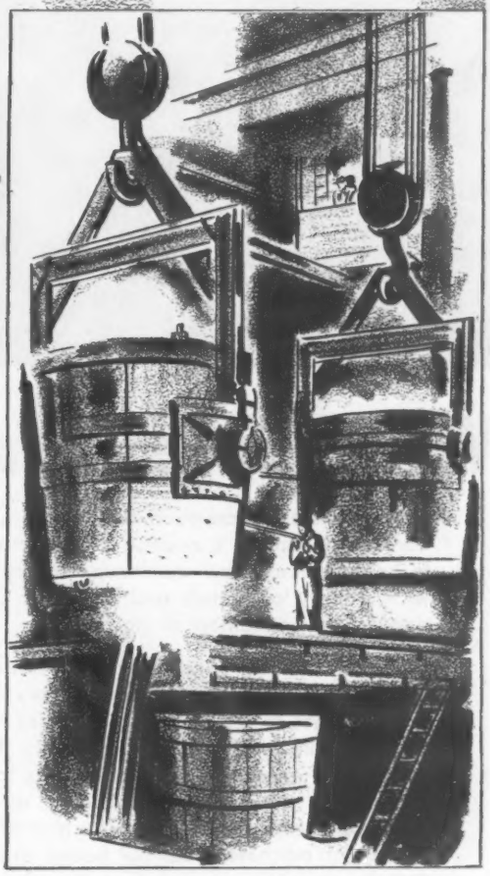
4411 W. National Ave., Milwaukee 14, Wis.

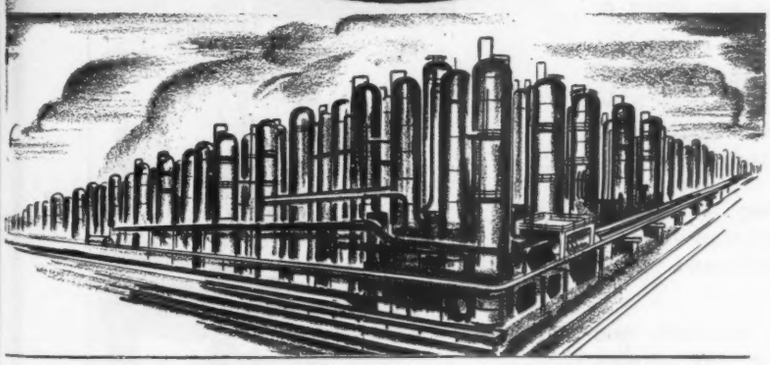
HARNISCHFEGER CORPORATION

HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

Do you know that . . .

SINCLAIR PRODUCING OIL WELLS IF PLACED END UNDER END WOULD REACH TO THE CENTER OF THE EARTH—MORE THAN 3,500 MILES. SINCLAIR RANKS AMONG THE LARGEST PRODUCERS OF CRUDE OIL.



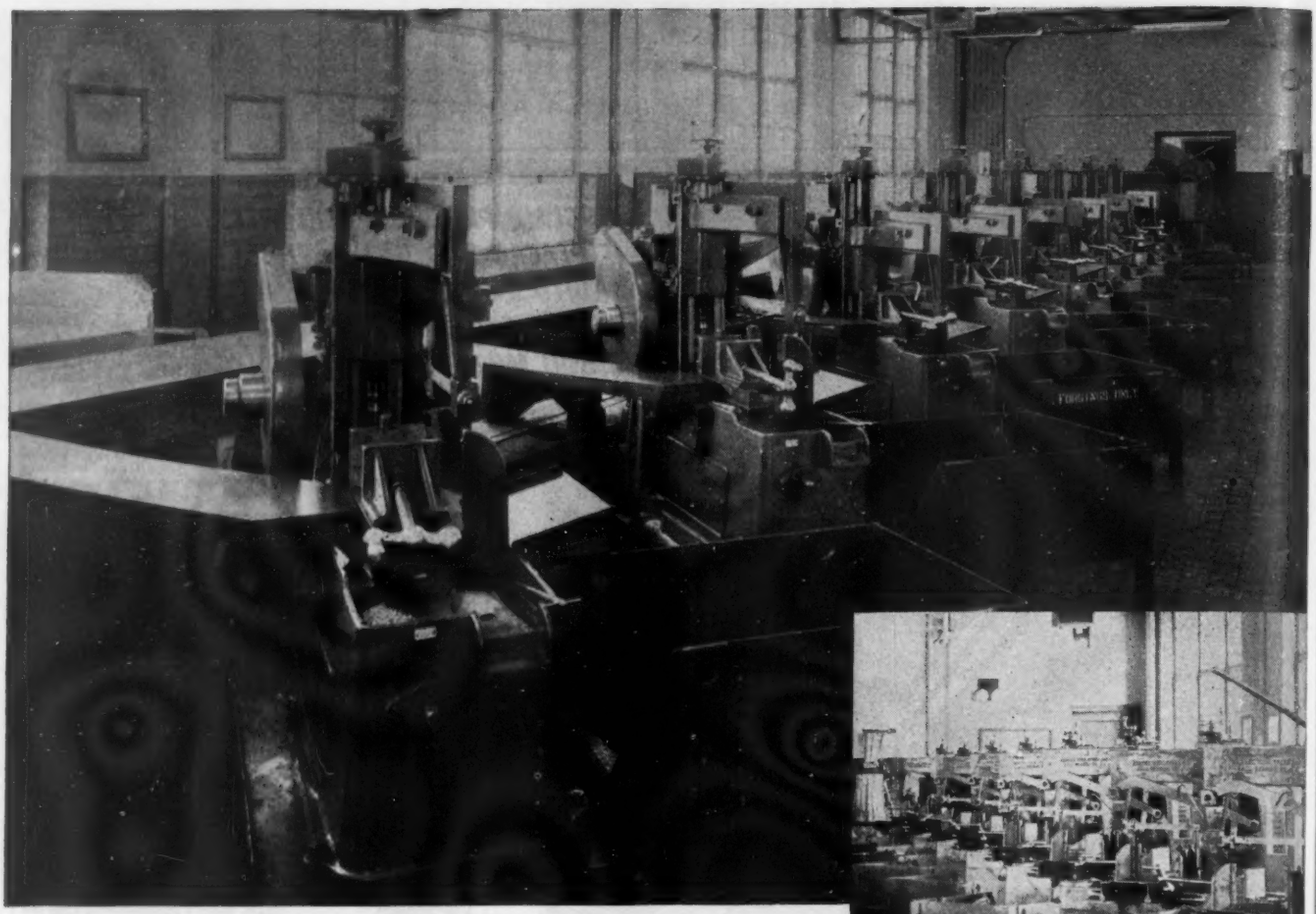


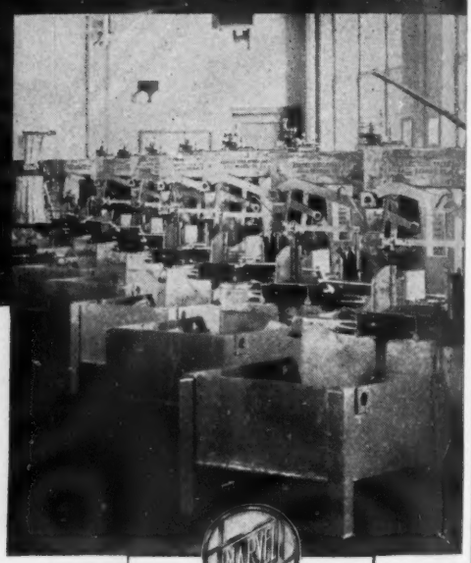
SINCLAIR'S 10 GREAT REFINERIES, IF MASSED TOGETHER, WOULD COVER AN AREA OF 2,300 ACRES —THE APPROXIMATE AREA OF A CITY OF 100,000 POPULATION. THESE REFINERIES MANUFACTURE A FULL LINE OF QUALITY PETROLEUM PRODUCTS FOR ALL MILITARY, INDUSTRIAL AND GENERAL USES.

FOR BETTER LUBRICATION OF STEEL MILL EQUIPMENT SINCLAIR PROVIDES ANTI-OXIDANT OILS FOR CIRCULATING SYSTEMS . . . SPECIALIZED GEAR AND CABLE LUBRICANTS . . . HIGHLY EFFICIENT TURBINE AND COMPRESSOR OILS . . . BEARING GREASES SUITED TO ALL OPERATING CONDITIONS.

SINCLAIR IS EQUIPPED TO SERVE YOU BETTER!

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.



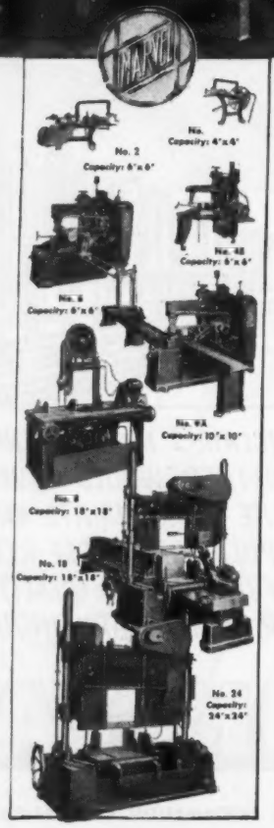


Where Speed Counts Most!

Increased steel production and more rigid inspection during the war has made it necessary for metallurgical laboratories to require hack saw machinery for specimen cutting of a wide variety of metals and alloys of almost any shape or size—in any condition of hardness.

The photos shown here illustrate how one large steel mill in the middle west has installed a battery of Marvel Hack Sawing Machines to crop and cut-off slices for metallurgical tests of large billets of tough alloy steels. This company, along with many other steel companies, has found that the Marvel Machine is the only one capable of cutting the hardest alloys fast and economically. The Marvel is the most universal cutting-off machine, built for heavy duty, continuous operation.

Marvel Saws increase production by rapidly, accurately and economically cutting-off the toughest steels in cross sections up to 24" x 24". If you have metal sawing problems, Marvel Sawing engineers are available to discuss and analyze your cut-off work—to recommend methods and equipment.



ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 W. Bloomingdale Ave. Chicago 39, U. S. A.

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.

MARVEL SAWS

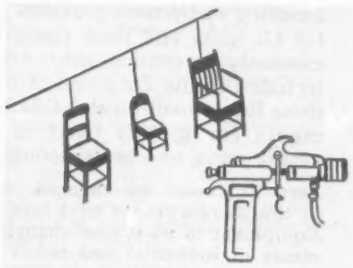
Here's How HIGH-SOLIDS Lacquers Cut Finishing Costs

It's not the cost per gallon that determines finishing costs—more important to consider is the finishing cost per unit!

High-solids lacquers mean thicker, fewer coats and many other savings that cut production costs drastically. Here's how:

High-solids nitrocellulose lacquers deposit thicker films at spraying viscosity, giving you the same finish with fewer coats.

You save valuable floor space with high-solids lacquers. The fewer number of coats, the smaller the area needed for finishing and work in process.



It's easy to apply high-solids lacquers by any of the usual commercial methods . . . spraying, flow-coating, tumbling, dipping, or roller-coating.

Nitrocellulose lacquers are still the fastest-drying finish . . . in minutes at room temperature. No expensive baking equipment is needed.

One of lacquers' biggest advantages is the ease with which any scratches or imperfections in the finish can be retouched or repaired.

Ask your supplier for complete details. Hercules makes no lacquers . . . concentrates on production of highest-quality nitrocellulose.

HERCULES

HERCULES POWDER COMPANY
INCORPORATED

930 Market Street, Wilmington 99, Delaware

CL-52

ZURN

FLUID HANDLING EQUIPMENT

An Engineering Service to Keep Pipe Lines Open

WHAT specific protection does your fluid handling equipment require? That is where Zurn Engineering Service begins. Its first objective is to discern the exact protective function required of a fluid handling unit under a specific service condition. This engineering service backed by over 40 years of broad technical experience, and the production of a wide range of fluid handling equipment provides protection for all units and lines operating intermittently or continuously. All products included in the Zurn line of Fluid Handling Equipment meet A.S.M.E. requirements for metals used in pressure vessel parts, and are thoroughly tested.

Zurn Engineers are engaged continuously in the development of Fluid Handling Equipment to meet ever-changing requirements of industrial and power plants for adequate protection of all types of pumps, traps, regulators, aspirators, injectors, control equipment and valves. Do not restrict your inquiries to the products illustrated, but write the Zurn Research and Development Department when you need a new device for a specific purpose or standard equipment for special installations. Zurn Fluid Handling Equipment is made of metals and alloys (cast bronzes, cast or formed stainless steels, monel metal, carbon steel, cast semi-steel, cast iron, as well as coated, plated or lined adaptations of these metals) to meet specific operation requirements and to provide for corrosion resistance and special flow characteristics.

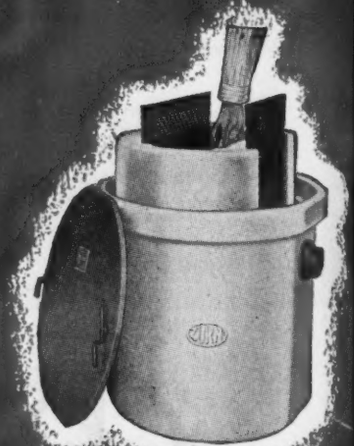
Ask a Zurn Fluid Handling Equipment Engineer (list on opposite page) to keep your engineers up to date on developments of fluid handling equipment, its specification and installation.

J. A. ZURN MFG. CO. • ERIE, PA., U.S.A.
Industrial Division

DUPLEX PIPE LINE STRAINERS: Include Duplex Vertical Chamber Type strainer for high or low pressures, and Duplex Horizontal Tube Type Strainer for low pressure, tested for maximum working pressures up to 25 lbs. /sq. in. These strainers are used where continuous operation and maximum flow are required; they protect equipment from damage caused by precipitates, crystalline aggregates, dirt (sediment), scale, filings and other particles and impurities.

SAFETY VENTS: Include Safety Vents and Level Safety Vents for venting tanks and processing vessels containing inflammable liquids and vapors. They are vapor valves which provide a wide margin of protection against fire and explosion. Available with flange, I.P.S. threaded, or butt-weld connections.

DISCHARGE CHECK VALVES: Protect against contamination of liquids, fouling of pumps and equipment tied into discharge lines carrying steam, sludge, waste water and many other waste liquids in gravity flow installations; available in 180° straight types and 105° and 90° angle types, with or without manual control.



SOLIDS INTERCEPTORS: For [illegible] particles of plaster, plastics, metal chips, glass, grinding compounds, and other solids which cause damage to valves and other operating equipment, or clog drains; usual application on waste water drainage lines. Interceptors for lint, hair, threads and similar substances also available.

ZURN

FLUID HANDLING EQUIPMENT

for INDUSTRIAL PLANTS

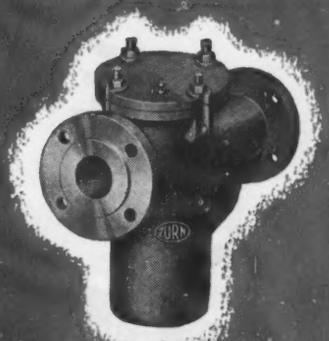
PROCESS

GE EQUIPMENT

Service You Can Use

es Operating Continuously

PIPE LINE STRAINERS: Available with ...ge, I.P.S. threaded, or butt-weld connec... removable, perforated strainer sleeve, ...d threaded blow-off connection, when ...ified. Angle Type High Pressure Pipe ...e Strainer for vapor steam or gas ...ices also available.



PRESSURE AND FLUID LINE STRAINER FOR HIGH OR LOW PRESSURES: 180° straight through and offset types and 90° straight through and offset types; both types with bolted covers and flanged connections; cleanout plug furnished to permit blow-down cleaning.

REMOTE VALVE CONTROL BOXES: Provide a ...modern method of operating inaccessible or ...ard-to-get-at valves. Zurn Remote Valve Con... Assemblies include remote valve control box ...d all essential parts for hooking up the control ...echanism with the valve that is to be operated.

INTERCEPTORS FOR WAX, GREASE, FATS AND OTHER LOW DENSITY INSOLUBLES: A positive means of avoiding contamination of sewage outlets; also prevent drain clogging; available in cast iron and V.G.E. (Vitreous Glazed Earthenware) construction. Volatile Liquids Intercepting Drains for oils, gasoline, naphtha, etc., to safeguard against hazards of explosion and fire, also available.

The Zurn line of Fluid Handling Equipment includes Duplex Strainers for high and low pressures, Pressure and Fluid Line Strainers, "Y" Strainers, Safety Vents, Discharge Check Valves, Remote Valve Control Assemblies, Interceptors for Wax, Grease, Fats, and other low density insolubles, Volatile Liquids Intercepting Drains, Solids Interceptors and Lint Interceptors. Zurn Catalog No. 45 illustrates, describes and gives dimensional data on this equipment. Attach coupon to your letterhead and mail today for your copy. Zurn Products also include a complete line of Roof Drains, Floor and Area Drains, Hydrants and Street Washers, to assure an efficient and protected drainage system for all types of buildings and areaways. Literature available upon request.

ZURN FLUID HANDLING EQUIPMENT ENGINEERING SERVICE IMMEDIATELY AVAILABLE TO YOU

This service is available to you by request direct to the factory at Erie, Pa., U.S.A., or, if urgent, wire or phone Zurn Fluid Handling Equipment Engineer nearest you.

Address J. A. Zurn Mfg. Co., in these cities: Albany 5, N. Y., 434 Clinton Avenue; *A..anta 1, Ga.,* P. O. Box 1978; *Birmingham 9, Ala.,* 227 LaPrado Place; *Boston 16, Mass.,* 453 Statler Bldg.; *Buffalo 2, N. Y.,* 908 Walbridge Bldg.; *Chicago 54, Ill.,* 962 Merchandise Mart; *Cleveland 15, Ohio,* 429 Schofield Bldg.; *Dallas 4, Texas,* 921 No. Peak St.; *Detroit 1, Mich.,* 403 Donovan Bldg.; *Indianapolis 4, Ind.,* 314 E. New York St.; *Kansas City 6, Mo.,* 946 New York Life Bldg.; *Miami 35, Fla.,* 1067 S. W. 18th St.; *Montreal, Canada,* 953 New Birks Bldg.; *New Orleans 2, La.,* P. O. Box 771; *New York 17, N. Y.,* 489 Fifth Ave.; *Philadelphia 8, Pa.,* 401 No. Broad St.; *Pittsburgh 16, Pa.,* 280 Orchard Dr.; *San Francisco 5, Calif.,* 85 Second St.; *San Juan, P. R.,* P. O. Box 663; *Seattle 4, Wash.,* 630 Central Bldg.; *Portland 2, Oregon,* 3425 S. E. Claybourne; *Washington, D. C.,* Rm. 940, Shoreham Bldg., 15th & "H" St.

Form No. 45-23

★ ★ ★

J. A. Zurn Mfg. Co., Dept. ST, Erie, Pa., U. S. A.

Please send me copy of Zurn Catalog No. 45 on Fluid Handling Equipment.

Name _____ Position _____

Company _____

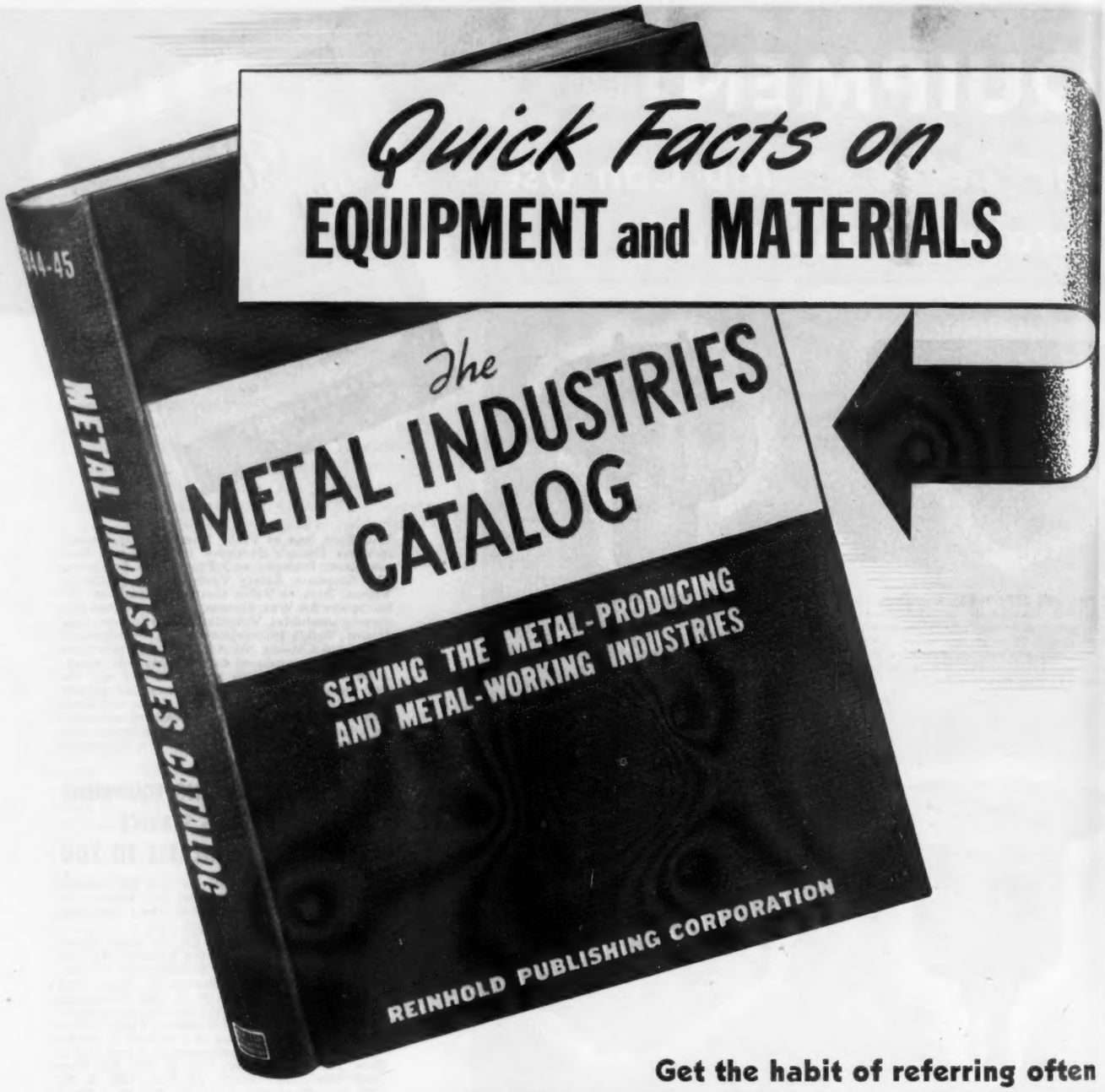
Address _____

City _____ State _____

Equipment

POWER PLANTS

INDUSTRIES



Metal Industries Catalog contains the product data (specifications, blue prints, etc.) of 186 leading manufacturers. Be sure that your copy is always right at hand, and *use it often!*

Get the habit of referring often to Metal Industries Catalog. M.I.C. is crammed with facts and figures on equipment and materials for the man who specifies and buys in the metal industries. M.I.C. is easily used too, because it is triple indexed—by company name, by trade name, by product.

REINHOLD *Publishing Corporation*

330 West 42nd Street • New York 18, N. Y.

Publishers of METALS and ALLOYS and PENCIL POINTS • Distributors of CHEMICAL ENGINEERING CATALOG

Advertising Managers for American Chemical Society Publications

BIRDSBORO

PRECISION Steel Castings *Start with* PRECISION MOLDS

Here you see men building a huge Randupson mold in the new Birdsboro foundry to produce a giant steel casting for the Navy. Birdsboro has specialized for many years in making Randupson Process castings that are exceptionally uniform and true-to-pattern — castings that will meet any inspection required. You'll find it economical to have your castings made by Birdsboro's Randupson Process. Consult us today on your casting problems.

BUY WAR BONDS

BIRDSBORO STEEL FOUNDRY & MACHINE COMPANY • BIRDSBORO, PENNA.

BIRDSBORO

PRECISION CASTINGS

MADE BY RANDUPSON PROCESS

What are "A-Q"* Gears?

"A-Q"* is a symbol for aircraft quality. Gears so designated represent a new development in power transmission. They must have extremely light sections and carry loads far in excess of values customarily considered safe design. They must operate at pitch line velocities that can be measured in miles per minute.

How Are Such Gears Produced?

Producing "A-Q"* gears demands control of material at every stage of production from billet to finished blank. It demands extraordinary care in heat treatment so that each gear is of the proper hardness at the tooth and at the core. It means holding every dimension to close tolerances and watching tolerances to prevent excessive multiplied error.

To achieve the extreme accuracy demanded in "A-Q"* gear production, Foote Bros. have developed new manufacturing techniques—revolutionary equipment.

Why Were They Developed?

The insistent demand of war for aircraft engines of tremendous horsepower produced by the thousands proved a serious problem in the development of gears for these engines. Engine manufacturers required gears closely approximating engineering perfection—and, furthermore, demanded that these gears be produced by the hundreds of thousands. By applying the "know-how" acquired in three-quarters of a century of gear manufacture, Foote Bros. met the need for these new gears.

How Can They Be Applied to Peacetime Products?

"A-Q"* gears offer many distinct advantages to the manufacturer of tomorrow's peacetime machines. They assure greater mechanical efficiency—a reduction in weight—greater speed—less noise—greater compactness—and a more economical transmission of power.

FOOTE BROS. GEAR AND MACHINE CORPORATION
Department X, 5225 S. Western Blvd. • Chicago 9, Illinois

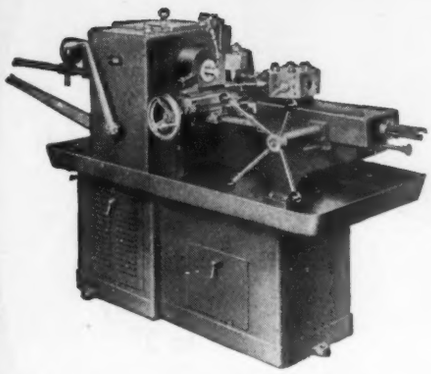
**"A-Q" Stands for Aircraft Quality*

FOOTE BROS.

Better Power Transmission Through Better Gears

This informative product engineering manual on "A-Q" gears contains data on a new and revolutionary type of precision gear. A copy will be sent to you on request as soon as it is ready.

"Very Satisfactory"



Oster No. 601 "RAPIDUCTION" Lathe. Equipped with either automatically indexing six station turret or with plain saddle and single tool post. Optional types of drive: WORM DRIVE or DIRECT DRIVE. Capacity: 1½" round bar.
Write for catalog 27-B.

OSTER

A critical shortage of highly skilled operators was faced by a manufacturer with large contracts for aviation valve stems and guides and other contracts for 20 mm. projectiles.

The "manpower shortage" was overcome by installing a battery of Oster "RAPIDUCTION" Lathes whose SIMPLIFIED construction and operation made possible rapid training of women with little or no prior experience as machine operators.

Results were stated by the owner of those Oster "RAPIDUCTION" Lathes to be *"Very Satisfactory."*

Wartime performance of Oster "RAPIDUCTION" Lathes forecasts a peacetime demand for Oster-engineered equipment designed for fast, accurate machining at low cost.

"Rapiduction" LATHES

THE OSTER MANUFACTURING COMPANY, 2037 EAST 61st ST., CLEVELAND 3, OHIO, U. S. A.

You can Meet Production Schedules with TAYLOR-WILSON MACHINES

Bar Capacity
1/16" to 2 1/2"

Tube Capacity
1/16" to 3"

for

Straightening, Sizing, Burnishing

Taylor-Wilson Machines are the B29s of industry. They have what it takes for continuous high production in the straightening, sizing and burnishing of rods, bars and tubes. Compact in design these machines occupy approximately half the floor space formerly required for such operations. All parts are over-strong. Circulating oil system lubricates and cools the work in process. Now being extensively used for processing airplane tubing.

Write for full information

WE ALSO MANUFACTURE Tube Testing Machines, Test Benches, Galvanizing Equipment for Pipe, Small Seamless Tube Mills, Tube Cutting-off Machines, Butt Weld Pipe Mills and Complete Line of Equipment for the finishing of pipe.

TAYLOR-WILSON MFG. CO.

Thomson Ave. (PITTSBURGH DISTRICT) McKees Rocks, Pa.

THE RED HOT BEARING *That Froze to Death!*

► **THE SCENE:** A 65 foot long, high speed press at Alco-Gravure Division of Publication Corporation, Chicago, Ill.—one of the nation's largest rotogravure printers.

► **THE PLOT:** The press has stopped. A moment before, an issue of a great national magazine was flying through the rollers. Now, there is the sound of anxious voices and the ominous smell of hot metal. Once more, a hidden bearing has run red hot . . . then frozen . . . *to death!* Precious time will be lost before it can be replaced . . . time that isn't allowed for in magazine printing schedules.

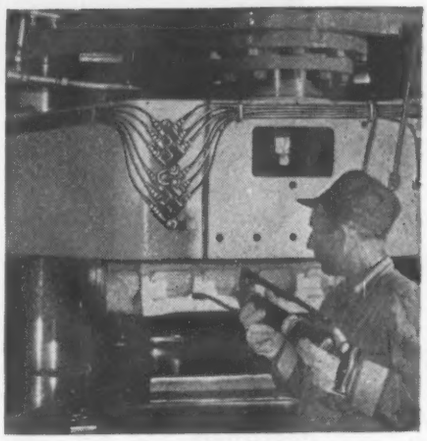
The press, including the folder, has more than 500 bearings that have to "take it," twenty-four hours a day, six days a week. This calls for super-lubrication. Yet, many of the bearings are inaccessible or difficult to reach with a grease gun. Many cannot be lubricated while the press is rolling. The result—more than 2 hours a day spent in lubrication, often by inexperienced oilers. Small wonder that bearings were overlooked.

► **THE HAPPY ENDING:** Management decided to end all possibility of human error by taking out "life insurance" for the press . . . *foolproof lubrication!* Alemite Lubrication Specialists recommended testing Centralized Lubrication on one unit of the press. Bearing failures stopped *at once!* The "go ahead" was given to equip the complete press and folder. Instead of 2 hours lubrication time per day, all 500 bearings will now require only 10-minutes per day *while the press is rolling,* for positive lubrication from a few central locations!

* * *

WITH ALEMITE Centralized Lubrication Systems, bearing failures due to faulty lubrication are eliminated—costly shutdowns avoided. Time for lubrication can be reduced more than 95% . . . costs of lubrication cut nearly 98%. . . . Because machines do not stop for lubrication, these systems add "M. P. T."* to any plant, enabling manufacturers to make and market a better product for less money. That's why most progressive companies with their eyes on post-war competition are installing Centralized Lubrication to obtain the competitive advantages of lower production costs. They want longer machine life and less depreciation.

**More Productive Time*



Illustrated above, is one of the four new Alemite Centralized Lubrication Systems at work. These systems are for manual or automatic operation on almost any type of machine.

Without obligation have an Alemite Lubrication Specialist call and demonstrate all four systems *right at your desk* with transparent working models. Examine them minutely . . . work them yourself. Actually see how machines get "M. P. T."* Drop us a line—Alemite, 1879 Diversey Parkway, Chicago 14, Illinois. In Canada: Belleville, Ontario.

ALEMITE

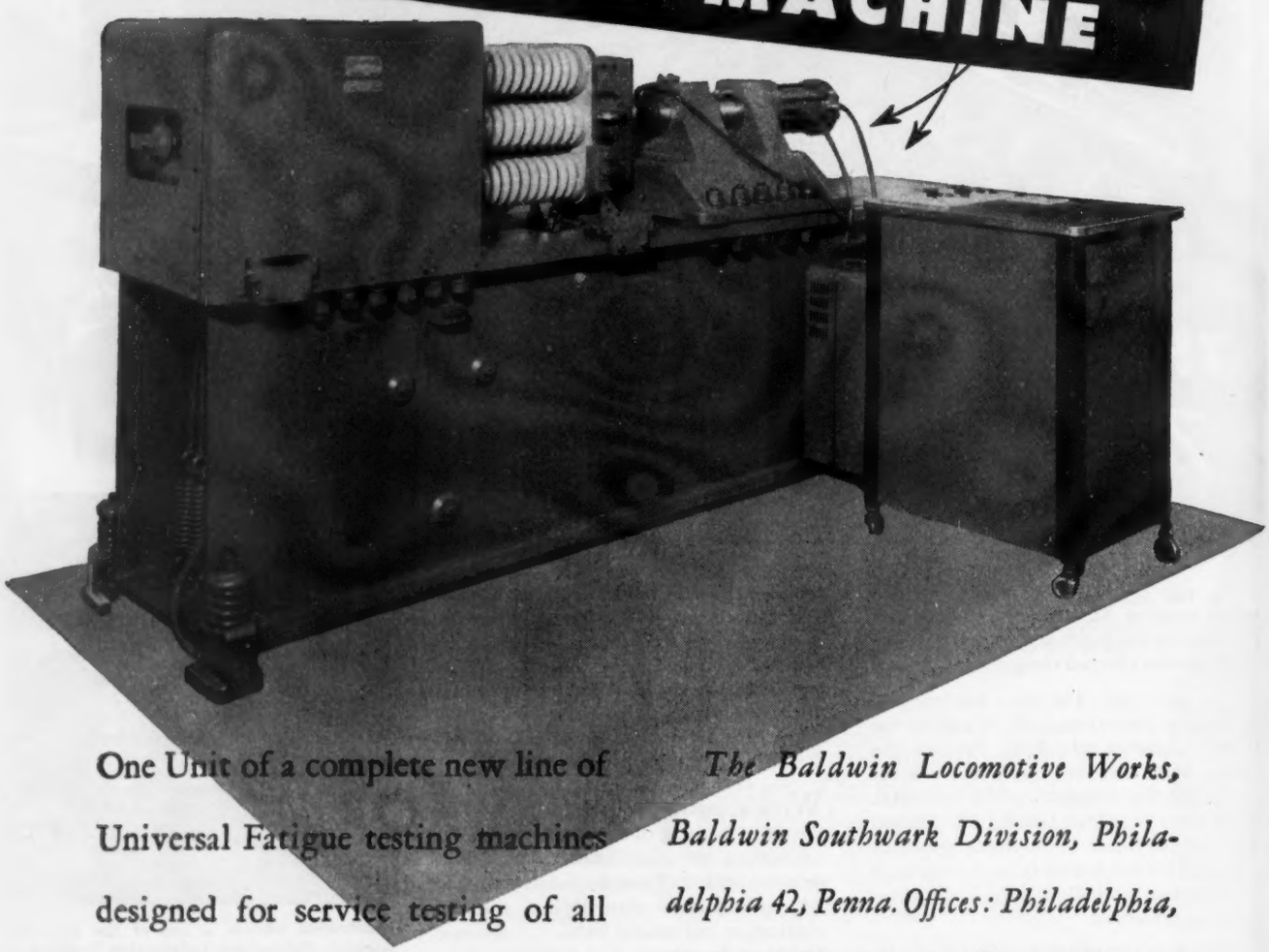
First in Modern Lubrication

Another Product of STEWART WARNER

CONSULTATION • EQUIPMENT • LUBRICANTS • ENGINEERING • MAINTENANCE

10,000 lb

UNIVERSAL FATIGUE TESTING MACHINE



One Unit of a complete new line of Universal Fatigue testing machines designed for service testing of all materials and assemblies. These models test in torsion, direct stress, and flexure and incorporate many novel loading and controlling methods.

The Baldwin Locomotive Works, Baldwin Southwark Division, Philadelphia 42, Penna. Offices: Philadelphia, New York, Washington, Boston, Chicago, St. Louis, Cleveland, San Francisco, Houston, Pittsburgh.

BLW THE BALDWIN GROUP **BALDWIN**

TESTING EQUIPMENT

Vanadium-alloys for victory

Tops in Tool Steels

★ HIGH SPEED

★ ALLOY

★ CARBON

•hot rolled •forged •cold drawn

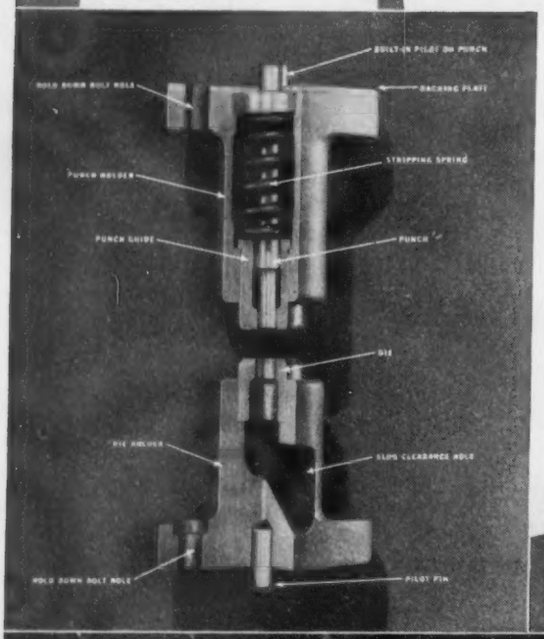
STEEL CO. LATROBE, PA.

Announcing WALES

TYPE "CD" HOLE PUNCHING UNITS

THAT REDUCE DIE MAKING TIME TO A QUICK ASSEMBLY OPERATION

Quarter section view of Wales Type "CD" Hole Punching Unit showing relationship of parts of the self-contained punch assemblies and die assemblies.



● Independent, self-contained Type "CD" punch assemblies and die assemblies produce many exclusive time-saving, money-saving advantages.

Dies may now be made quickly and put into operation long before a "custom made" die. In fact, it is often possible to put a die in operation the same day a pattern is released for production.

The same group of units may be used and reused in unlimited press brake and stamping press set-ups — thus keeping the investment in productive operation — not in "dead storage."

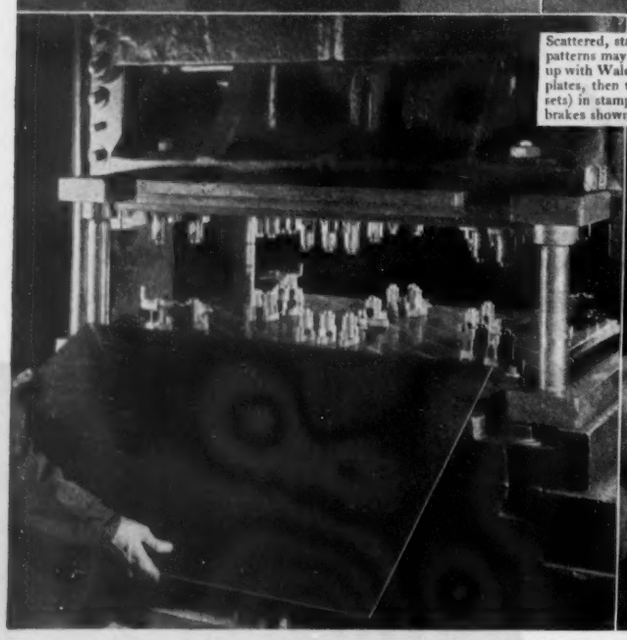
Wales Type "CD" Hole Punching Units eliminate making special punches, punch plates, stripper plates, die buttons, die plates, simplify die design and die making, and standardize punches, dies and stripping mechanisms.

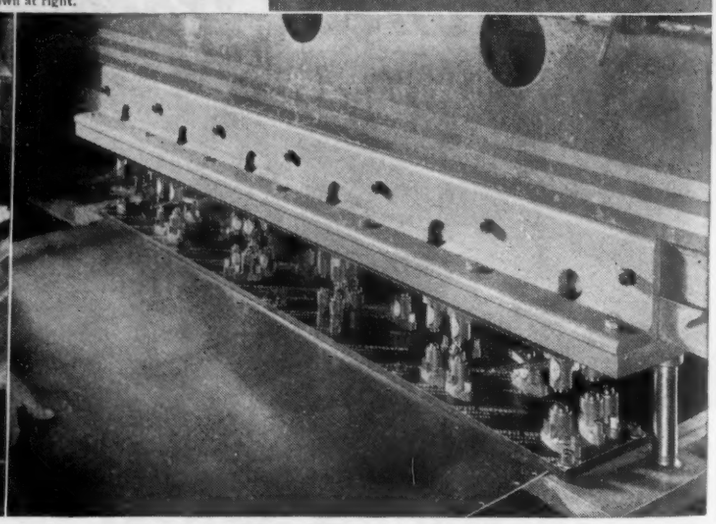
Write for functionally colored catalog TODAY that shows step-by-step set-up methods. The whole story is in one package!

WALES-STRIPPIT CORPORATION
385 PAYNE AVENUE, NORTH TONAWANDA, NEW YORK
(Between Buffalo and Niagara Falls)
GEORGE F. WALES, President

Specialists in Punching and Notching Equipment

Scattered, staggered and straight line hole punching patterns may be quickly, easily and economically set up with Wales Type "CD" Units mounted to templates, then to die sets (or mounted direct to die sets) in stamping presses shown at left and in press brakes shown at right.





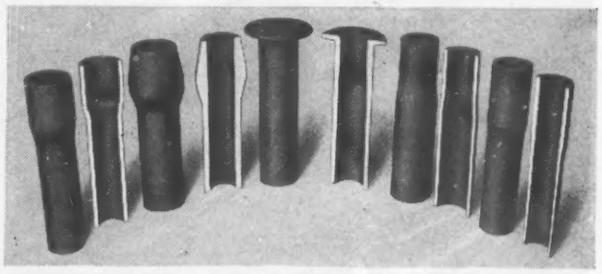
All Kinds of Steel Tubing for All Kinds of Jobs

B&W Mechanical Tubing is available in all carbon steels, NE alloys, SAE alloys, stainless and corrosion resistant steels.

Finding the right kind of tubing—Seamless or Welded—for each mechanical requirement is greatly simplified when the problem is put up to Babcock & Wilcox. Matching tubes to jobs—finding the steel analysis best suited for each purpose—is a specialty with B&W.

To this end, metallurgists and technicians are continuously searching for better alloys—testing for proper hardness and hardenability—checking yield strengths, elongation, and tensile strengths against service demands. At B&W your problems are considered in the light of experience with an unusually large variety of analyses, many of them available from no other source; first hand knowledge of the fabricating, machining, heat-treating, and other capabilities of steels from simple low carbons to high alloys. Making a complete range of both Seamless and Welded Tubing, B&W is in a position to match tubes to jobs without prejudice toward any type of materials. B&W recommendations are therefore impartial and unbiased.

Next time you have a job for tubing, chances are that B&W's experience in making and applying tubing for 35 years, its modern specialty tube mills, extensive laboratory facilities and vast fund of technical data, can save you time and trouble in finding the best tubing for the purpose.



Typical examples of special forms of B&W Mechanical Tubing

B&W MAKES BOTH

B&W TUBES

SEAMLESS. Complete range of carbon, alloy and Stainless steels. Sizes ½ in. to 8⅝ in. O.D.
ELECTRIC-RESISTANCE WELDED Carbon steel grades. Sizes: ¾ in. to 4 in. O.D.

THE BABCOCK & WILCOX TUBE CO.

Welded Tube Division, Alliance, Ohio — Seamless Tube Division, Beaver Falls, Pa.

TA-1320

6249

New Universal Grippits and Plungers Speed Production, Increase Accuracy

Left: Universal Plungers are available in three sizes from ½" to 1" diameter.

Above: Universal Grippits are available in four sizes with diameters from ½" to 1".

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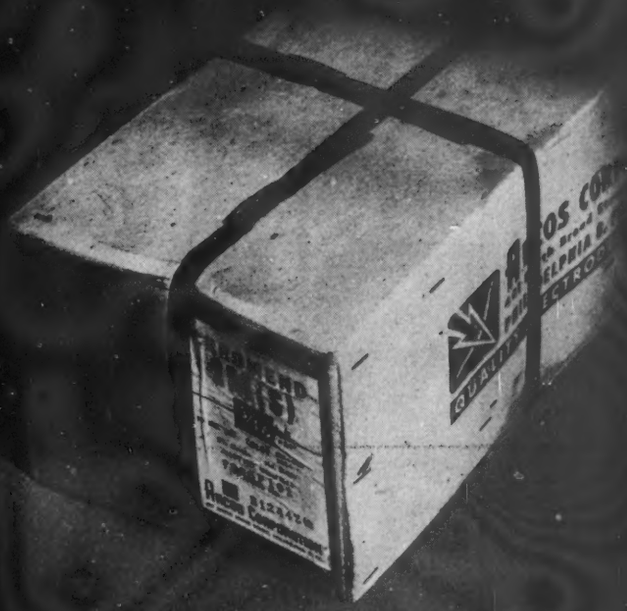

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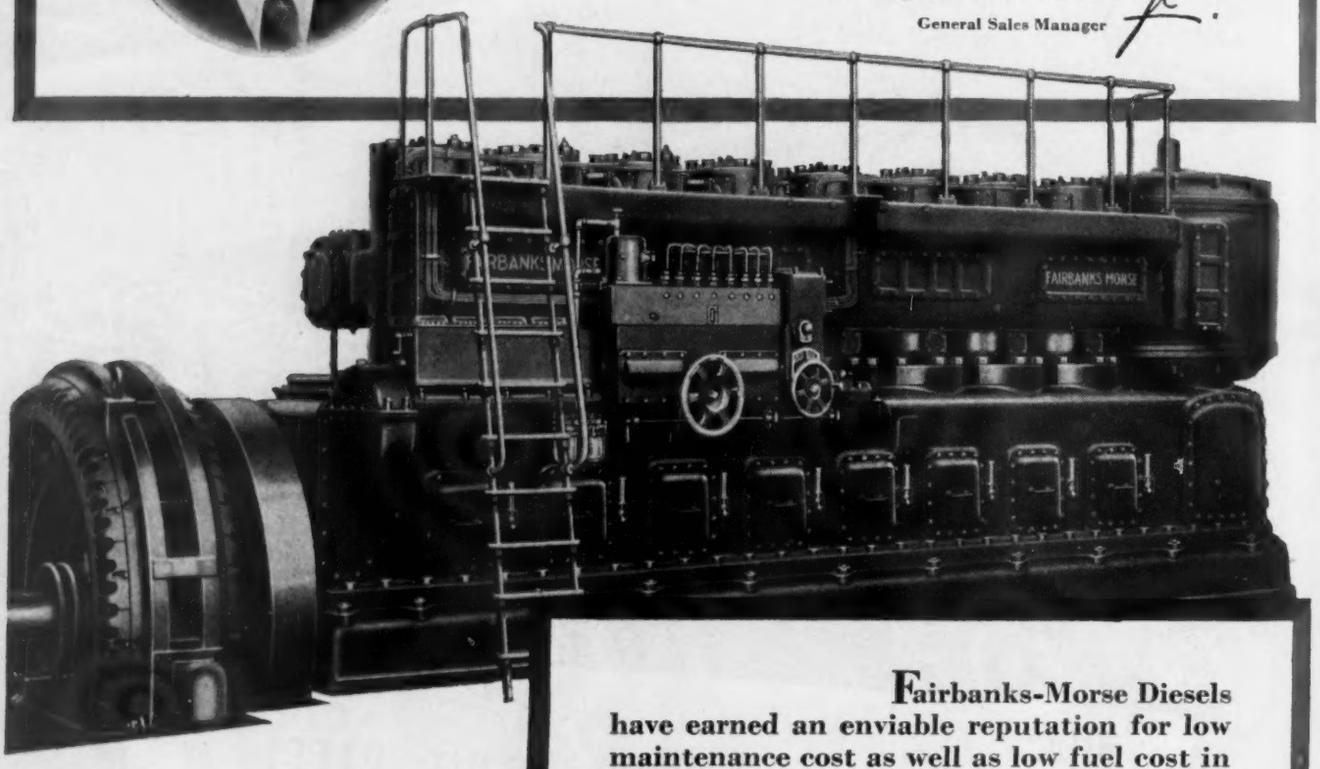

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STEEL

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UNION CHAINS

STEEL
February 19, 1945

Industry's Stake in Yalta

While some sharp criticism has been voiced against the Crimean conference, the consensus of majority opinion in the United States, Great Britain, Russia, China and France seems to be that the spirit of unity which prevailed at Yalta is something substantial on which the people of the world can pin their hopes for lasting peace.

In the United States, the reaction to the news from the Black Sea has been exceptionally favorable. Members of both parties in Congress, with few exceptions, have hailed the pact as a great step forward. The press, while cautious about approving certain details, has been generally laudatory of the overall results. On all sides there is a strong belief that the next meeting, scheduled for San Francisco on April 25, will find the nation unitedly committed to a world organization for peace.

If this belief is borne out by subsequent events, then the United States, in company with other great powers, will have embarked upon a project more important than anything that has happened in many centuries. World War I brought death to 8,000,000 military men and to 8,000,000 civilians, maimed 6,000,000 for life, caused property damage of $56 billion and cost the belligerent nations $202 billion. The combined losses, estimated at nearly $500 billion, represent only a fraction of the total losses now being sustained in World War II. Can there be anything more important than attempting to avoid future repetition of a scourge which in a single generation wrought destruction calculable in trillions of dollars?

Leaders of the iron, steel and metalworking industries will be among the first in line to promote efforts for enduring peace. Heavy industry long since has repudiated the one-time prevalent fallacy that wartime business is profitable. Just before the present conflict began, American industrial leaders were warning the nation against the delusion that a wartime economy is beneficial. Now that hundreds of millions of tons of industry's precious materials have gone down the sewer of war and the skills of its technical and operating personnel have been prostituted for the evil of destruction, American industry in its proud role of "arsenal of democracy" has greater reason than ever before to work for peace.

Marked progress has been made since the days when the public believed that many of the large producers of armament were actually in favor of conflict between nations. The next logical step forward is the absolute prevention of war.

SENATE CALLS BLUFF: High-explosive tactics employed by the administration to induce quick action on the work-or-fight bill are back-firing. It is unlikely that the bill can survive unless it is modified almost to the point of impotency. Meanwhile, there is a fair chance that new legislation will supplant it.

No single influence is responsible for stymying this bill. Union labor, employer organizations and farm groups are opposing it, chiefly on the grounds that it isn't necessary and that the entire manpower problem has been bungled. Also pertinent is the conviction that some administration spokesmen who spoke for the bill, did so with tongue in cheek.

The upshot is that instead of a drastic work-or-fight bill we will get congressional approval of one or more of the direct-action programs—the Allentown, Cleveland, Chicago or other "plan." One manufacturer brought the entire issue down to brass tacks when he made this proposition to interested government agencies:

Return to us 50 of our "prime essential" key men

(OVER)

in the armed services in exchange for 50 of our less-skilled men and we will guarantee a 25 per cent increase in production.

It would be unwise to dismiss or laugh off this challenge lightly. —p. 86

• • •

ELECTRONIC ROBOTS: Automatic controls used in conjunction with recently developed resistance welding systems pave the way for interesting innovations in the heating of metals. Indicative of the possibilities is the experience of a manufacturer of railroad equipment who has been successful in adapting a spot welder to forging operations.

One of his routine manufacturing problems consists of forming rivet heads on both ends of clevis pins. He has rigged up a 135-kilovolt-ampere three-phase-to-single-phase resistance welder so that with proper electrodes and with electronic timing of power applications, heat and pressure are applied to the ends of clevis pins to form the desired upset rivet heads quickly and accurately.

The success of this and similar operations centers around the precise control that is afforded by electronic devices. Given a sufficient volume of repetitive work, this automatic selectivity of heat, power, speed or pressure offers attractive possibilities in manufacturing technique. —p. 106

• • •

PRODUCTION FOR WHAT? Obviously manufacturers heavily engaged on war contracts will try to reconcile the Byrnes statement regarding large-scale military operations in Germany in March with the heavy volume of new orders placed since the beginning of the year. Reports from Detroit indicate that new orders amounting to $600 million were placed in that area in January and others totaling $136 million were booked in the first 10 days of February. Little if any of the materiel covered by these contracts can reach Europe in time for action in March.

Therefore, it must be assumed that the substantial volume of new orders must be for the Japanese war, for later eventualities in Europe or for the somewhat dubious purpose of maintaining "peak production and employment" regardless of requirements.

This last reason is curious. Has morale actually deteriorated to the point where we must produce unnecessarily to keep people from bolting war jobs? —p. 91

MAY TEST U. S. POLICY: Almost overnight Geneva Steel Works has become an industrial Cinderella. Once an unwanted wall-flower, she now has several suitors bidding for her hand. U. S. Steel and Henry J. Kaiser have evinced interest and it is reported that interests which recently acquired control of Wickwire Spencer and Colorado Fuel & Iron also may consider purchase or lease of the plant. At a meeting of the Western States Council in Salt Lake City, executives of the Union Pacific and Southern Pacific railroads assured representatives from 11 western states that freight rates will be no obstacle to operation of the Geneva plant after the war.

Disposal of the Geneva and Fontana properties is important nationally. It may bring forth an early determination of government policy on war plant disposal. —p. 75

• • •

ACCENT ON PROGRESS: Pullman-Standard Car Mfg. Co. has announced a plant modernization and construction program to facilitate postwar building of new types of passenger cars. Plans call for bar-lounge cars—transformable into night clubs or theaters, "day-nite" coaches, diners with diagonal seating, "threedex" coaches seating 112 passengers on three levels, duplex-roomette sleepers and three-tier sleeping cars with 42 berths. Sounds like a strong bid for postwar railroad passenger traffic. —p. 102

• • •

INITIATIVE AND FORESIGHT: Two groups of tool and die manufacturers have analyzed the unusual economic and operating characteristics of their industry. The study will afford a basis for individual company postwar planning. Self-examination of this kind is good for any industry. —p. 103

• • •

SO SORRY, HIROHITO! Recapture of the Philippines deprives Japan of an important source of iron ore, chrome ore and manganese. The enemy's annual take from the islands during occupation probably exceeded 1,000,000 tons of iron ore and 50,000 tons of chrome ore. —p. 80

• • •

CONGRATULATIONS: To the officers and employes of McInnes Steel Co. and of Vlchek Tool Co. on the celebration of their fiftieth anniversaries on Feb. 10 and Feb. 17, respectively. —p. 102

E. L. Shaner

EDITOR-IN-CHIEF

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Freight Rate Aid Seen for Geneva

Western States Council, planning maintenance of Coast's war-expanded heavy industry, heartened by railroads' promised co-operation and by competition for lease or purchase of new mills

SALT LAKE CITY, UTAH

FREIGHT rates will be no obstacle to the postwar operation of the Geneva, Utah, steel plant, representatives of two important railroads assured delegates to the Western States Council meeting here last week to plan a campaign for the continuance of the war-born western steel industry after the emergency ends.

The council, comprised of representatives of 11 western states, was heartened by the railroad officials' assurances and also by earlier declarations by United States Steel Corp. and by Henry J. Kaiser that both were interested in buying or leasing the Geneva property. The Utah plant was built by and is operated for the government by U. S. Steel subsidiaries.

In addition to U. S. Steel and Mr. Kaiser, at least one other bidder for the government-owned Geneva plant was reported in New York last week. This is a syndicate associated with Charles Allen Jr., of Allen & Co., investment bankers, which already has acquired control of Wickwire Spencer Steel Co., New York, and Colorado Fuel & Iron Corp., Denver.

Fontana Plant Not on Market

U. S. Steel also has informed Defense Plant Corp. that it would be interested in acquiring the Fontana, Calif., plant built and operated by Mr. Kaiser on Reconstruction Finance Corp. loans. Mr. Kaiser retorted to this proposal that the Fontana plant "is not and will not be for sale."

Thus the proponents of an expanded heavy industry for the West in the postwar period, who a few weeks ago were uncertain as to the feasibility of operating the emergency-necessitated plants in peacetime, were encouraged in their hopes.

To adapt either the Geneva or Fontana plant for peacetime operations will require investment of additional millions of dollars to install strip mills and other facilities.

The great question as to the postwar future of the two new western mills has been that of costs and freight rates have been one of the most important cost factors.

F. W. Robinson, senior vice president of the Union Pacific railroad, which hauls

(*Please turn to Page* 192)

Announcement the United States Steel Corp. is interested in purchasing or leasing the government-owned steel plant at Geneva, Utah, is causing much speculation with respect to ultimate disposal of this property, built at estimated cost of $200 million. Shown above, left to right, are Benjamin F. Fairless, Irving S. Olds, and Enders M. Voorhees, president, chairman and chairman of the finance committee, respectively, of U. S. Steel

Government War Plant Disposal Policy Still in Formative Stage

Interest evinced in Geneva Steel Works by private interests provides first real opportunity for establishing clear-cut course of action in handling problem. Government's reaction to offers hinges upon terms of Surplus Property Act of 1944

WASHINGTON

NOW that the United States Steel Corp. formally has notified Defense Plant Corp. it is interested in purchasing or leasing the government-owned Geneva Steel Co. plant near Provo, Utah, which it built and is operating for DPC, and the Kaiser Co. Inc. also (STEEL of Feb. 12, p. 65) has indicated an interest in acquiring these facilities, the government units responsible for disposing of the government's wartime investments in industrial plants have been presented with the first real opportunity for establishing clear-cut policies to be followed in these cases.

The policy of disposing of plants that, like Geneva, cost the government more than $5 million has not, up to this time, gone beyond the procedure laid down in the Surplus Property Act of 1944. This stipulates, in Section 19a, that the Surplus Property Board shall prepare and file with Congress a report: "A—Describing the amount, cost, and location of the property and setting forth other descriptive information relative to the use of the property; B—outlining the economic problems that may be created by disposition of the property; C—setting forth a plan or program for the care and handling, disposition, and use of the property consistent with the policies and objectives set forth in this act."

The board was strictly enjoined by this act from making any disposition of a property such as the Geneva Steel Co. "until 30 days after such report (or additional report) has been made while Congress is in session, except that the board may authorize any disposal agency to lease any such property for a term of not

WILLIAM A. ROSS

As president of Columbia Steel Co., West Coast subsidiary of U. S. Steel, Mr. Ross recently announced the Steel corporation was interested in purchasing or leasing the government-owned steel plant at Geneva, Utah

more than five years."

Section 20 of the Surplus Property act provides that a disposal agency entering into negotiations for disposition of a plant or plants which cost the government $1 million or more, "shall promptly notify the attorney general of the proposed disposition and the probable terms and conditions thereof." The law gives the attorney general 90 days in which to advise the disposal agency whether, in his opinion, the proposed disposition will violate the antitrust laws.

There are other provisions of the Surplus Property act which will be called into play in the case of disposition of the Geneva Works. One instruction reads: "It shall be the duty of the board to devise ways and means and prescribe regulations to prevent any discrimination against small business in the disposal and distribution and use of any surplus property." The Smaller War Plants Corp. is charged with the responsibility for seeing to it that such properties are disposed of in ways that do not discriminate against small business.

What the government will reply to the Steel corporation Geneva inquiry, therefore, depends a great deal on what the Surplus Property Board decides may be done legally under the terms of the Surplus Property act, whether the attorney general rules that disposition of the properties to the leading interest in the steel industry would not encourage monopoly, and on any course of action that might be dictated by Congress as a result of its consideration of the Surplus Property Board's report on Geneva.

It is recalled, in this connection, that when Will L. Clayton refused to continue in the post of surplus property administrator he based his decision on his opinion that the new Surplus Property act is "unworkable."

In addition to forcing a determination as to whether a plant like Geneva may be sold, on the one hand, to a large corporation such as the United States Steel Corp. or, on the other, to a smaller "independent" like Henry Kaiser Co. Inc., and whether Geneva should be sold in one parcel or split up to meet the requirements of "small business," the Steel corporation's show of interest in Geneva also should bring to an issue the extent to which the government is prepared to sacrifice a big percentage of its investment in such a property in order to permit it to be operated on a sound financial basis after the war.

On numerous occasions government officers responsible for disposition of surplus property have stressed the necessity of offering these properties at prices their prospective buyers could afford to pay. Repeatedly they have told interested congressional committees that prices could not be set by any formula other than a very general one. It is necessary, they have declared, that each property must be appraised so as to allow for all considerations.

In a recent hearing of the Senate Mead (formerly Truman) Committee, Hans A. Klagsbrunn, deputy surplus property director for the Reconstruction Finance Corp., described the viewpoint of his organization as follows:

"Our method of pricing has been, in general, to arrive at reproduction costs as of today; that is, taking account of today's labor and material costs, and deducting for such obvious wartime costs as, perhaps, the cost of camouflaging, and the shooting range of antiaircraft embankment, and also taking out such costs as overtime for rushing the work or digging foundations in cold weather, which would not be a normal construction process.

Base Negotiating Price

"Then we are willing from that figure to deduct normal depreciation and, in appropriate cases, give consideration to some adjustment for alteration of the plant to meet particular civilian needs. That is our base price in negotiating. If we make a sale, we are in a position to extend credit, make liberal financing terms as would suit the particular needs of a case. There is no rule-of-thumb."

Whether the ideas about fixing valuations are as flexible as they need to be in order to reach a price on the Geneva properties that would provide a good postwar financial base remains to be seen. Informed observers at Washington believe that to sell Geneva the price that would be justified from a potential buyer's point of view might be balked at by the government.

In quarters where a sound understanding of the steel industry's economics is imperative, the following rule has emerged as a result of observations over a number of years:

"At capacity operations, annual sales of an integrated steel company should be approximately equal to the company's capital investment if a fair profit is to be made." The truth of this appears to be borne out as a result of studies of past performance. For example, 14 integrated steel companies in 1941, operating at 97 per cent of ingot capacity, had sales whose dollar value was 1.04 per cent higher than their combined capital investment and their average return before taxes was 16 per cent. These same companies in 1940, operating at 82 per cent of ingot capacity, had sales whose dollar volume approximated 76 per cent of their combined capital investment, and their return before taxes was 9.5 per cent.

HENRY J. KAISER

Prominent in West Coast industry, including steel, Mr. Kaiser has announced he is making a study of the Geneva Works to determine whether it would complement his iron and steel plant located at Fontana, Calif.

Conversely, the rule is: "If a steel company's capital investment is much higher than the value of its total sales during a year of capacity production, it cannot make a fair profit."

Dealing in round figures for purposes of simplification, Geneva has annual ingot capacity of around 1,300,000 net tons. Assuming that the finished product yield is about 70 per cent of the ingot output, and that the average mill price for the product is in the neighborhood of $55 a ton, that would mean total sales of $50,000,000 during a year of capacity production.

On the basis of the above rule, therefore, a prospective buyer would not be justified in paying more than $50,000,000 for the whole Geneva layout. In round figures, Geneva cost the government in the neighborhood of $200,000,000, so that a sale at $50,000,000, even after making full allowance for depreciation and other deductions, would represent a substantial loss to the government. Whether the government would agree to charge off such a loss to the overall cost of fighting the war remains to be seen. It is easy to foresee, however, in the event that a sale should be made at some such figure, that Congress might feel disposed to ask some questions.

Exact steelmaking costs at Geneva

never have been made public but the operation there is known to be in red ink even though Geneva is allowed to charge $9 a ton higher, f.o.b. Pacific ports for plates and shapes than the so-called market prices at those ports. On Oct. 3, 1944, when the Office of Price Administration authorized the Geneva Steel Co. to quote 3.20c base, f.o.b. Pacific ports on plates and shapes, and 3.25c on bars, the OPA authorization contained this statement:

"An examination of the cost data submitted with the original petition indicates that realization from the requested prices will not cover current costs. Your petition is, therefore, granted in the amounts requested."

The prices for which Geneva Steel Co. asked authorization, and which the OPA approved, it may be explained, are those applying to plates and shapes shipped by rail from mills in the Chicago district. Geneva Steel Co. sighted on these prices as being a competitive target; it never asked for prices to cover its full costs.

In its original document of May 18, 1944, authorizing Geneva to quote the 3.20c price on plates (it was not then ready to roll shapes and bars), the OPA further stressed the high costs at Geneva by remarking "the cost of producing these items (blooms, billets, slabs and plates) are comparable to costs of other steel mills with the exception of depreciation which is considerably out of line because of the excessive cost of constructing such a facility in war time," and "a further cost factor which must be considered is freight since this mill is located in an area where there is a very minor demand for steel," and "after careful consideration and because of the emergency nature of your plant and its essentiality to the war effort it has been decided to issue this order . . . ."

Subsidy May Be Provided

As to the competitive situation in steel products which will prevail on the Pacific coast after the war, Washington observers are loath to make predictions. Many Pacific spokesmen of late have laid stress on the importance of the Geneva properties in Utah and the Kaiser properties at Fontana, Calif., as sources of finished steel products on which to base a considerable portion of the Pacific coast economy after the war. There is a strong disposition, both in Congress and the administration, to do something to help the Far West in the postwar era, particularly in view of the big increase in population in that area during the war because of manpower needs of airplane plants, shipyards and many other establishments. A government move, therefore, to encourage steel production through the use of a subsidy or some related device would not occasion much surprise.

Unless such a move develops, the western producers should meet keen competition when large-scale shipments again may be made by water from east and Gulf Coast ports by way of the Panama canal. For example, the current 2.20c base price on plates at Sparrows Point, Md., is lower than the 2.75c f.o.b. Pacific ports price to the extent of $11 a ton. This is a big spread in favor of the eastern mills when consideration is given to the likelihood that comparatively low ocean shipping rates should prevail after the war.

When Geneva started to produce steel, its rail freight to the various Pacific ports was $12 per net ton on finished steel products. Last year this rate was reduced to $8. Negotiations are in progress with western railroads with a view to obtaining a still lower rate. Prevailing view in Washington is that any help in this direction will be just a drop in the bucket. The real need is a writing down of the invested capital so that overhead charges will be more in line with similar charges on steelmaking facilities built in more normal times.

A feature of the Steel corporation's Geneva proposal that already has stirred up some discussion in government circles is the explanation that the corporation does not plan an increase in its basic steelmaking capacity, but that it expects to use Geneva to replace some of its less efficient existing units. It has been rather fundamental in the government philosophy in regard to government-owned war plants that all of these plants, aside from those that are put under grease and held for use in any future emergencies, should be used to increase production and employment.

Present, Past and Pending

■ ARMY FURLOUGHS SOLDIERS TO WORK IN ALCOA PLANT

KNOXVILLE, TENN.—Army is furloughing about 1000 Air Forces personnel to work for a 90-day period in the Aluminum Co. of America's sheet and plate mill at Alcoa, Tenn. First contingent of about 150 enlisted men arrived at the plant last week.

■ WAR EXPENDITURES DROP 4 PER CENT IN JANUARY

WASHINGTON—United States war expenditures declined 4 per cent in January to $7,520 million from $7,835 million in December.

■ WAR COMMITTEE ON CONVENTIONS DENIES 469 PLEAS

WASHINGTON—Between Feb. 1 and Feb. 9 the War Committee on Conventions denied 469 applications for conventions and gave approval to 15. List of approved meetings includes: Southern Coal Producers Association and United Mine Workers of America, wage conferences, Washington, March 1; Society of Automotive Engineers, subdivision on aeronautics, materials and processing, New Orleans, Feb. 27-March 2.

■ NEW RECONVERSION PLAN REPORTED PROJECTED

WASHINGTON—War Mobilization Director Byrnes last week was reported to have ordered a new "standby" plan prepared for reconversion of industry to civilian production. It was said the Byrnes' order directed WPB Chief Krug to work out by Feb. 23 a new blueprint to guide reconversion when military needs eventually slacken.

■ CREIGHTON AND KILMER RECALLED TO STEEL DIVISION

WASHINGTON—L. E. Creighton of Rotary Electric Steel Co., Detroit, and J. K. Kilmer of Bethlehem Steel Co., Bethlehem, Pa., have been recalled to the WPB Steel Division because of renewed activities.

■ SCRAP INDUSTRY SEEKS WMC CRITICAL RATING

WASHINGTON—Scrap industry is endeavoring to be placed on WMC's critical list due to low inventories at the mills.

■ ARMY 1945 PROCUREMENT SCHEDULES RAISED SHARPLY

WASHINGTON—Army 1945 procurement schedules have been raised $1,600 million over estimate made last month, due to increased war tempo, to $37,800 million, an increase of 18.9 per cent over 1944 deliveries.

■ SPECTROGRAPHER'S SOCIETY FORMED IN DETROIT

DETROIT—Spectrographer's Society has been organized here to disseminate information about spectrochemical analysis and to assist in improving methods and technique in spectroscopy and related sciences.

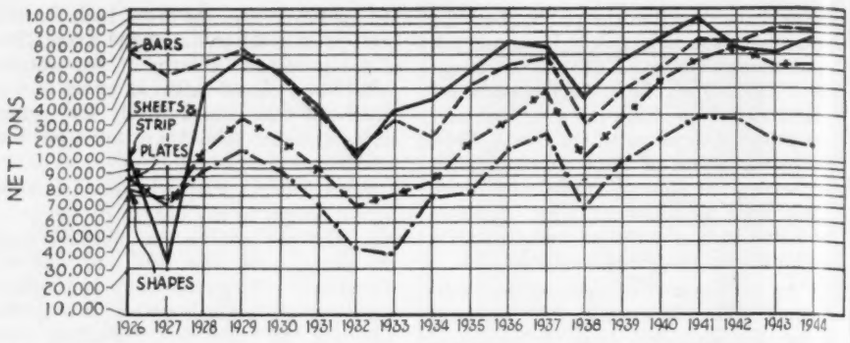
■ GALVANIZERS CALL OFF USUAL SPRING MEETING

NEW YORK—The Galvanizers Committee, sponsored by the American Zinc Institute, last week announced its usual spring meeting will not be held this year.

■ MACHINE TOOL ORDER BACKLOG EXCEEDS $300 MILLION

WASHINGTON—Unfilled Army, Navy, and Maritime Commission orders for machine tools total about $300 million. This total does not include enlarged lend-lease and other war-related foreign demands. Production cannot be increased without higher ratings for procurement of manpower and castings.

Tool Shops Curbed by Shortages



Little change has occurred in the overall steel mill product purchases by machinery and tool manufacturers for past three years. Trend in steel distribution by product classification from 1926-44 is shown in above chart

Scarcity of auxiliary equipment and tight manpower situation complicate delivery problem. Steel requirements change little

SHORTAGE of components and tightening manpower situation in the machine tool, industrial machinery and equipment industries has been accentuated in recent months by the enlarged war requirements for milling, broaching and automatic drilling machines, grinders, lathes, fractional horsepower electric motors, collets, chucks, and castings.

Pressure for delivery on direct war contracts, taken on by the machinery builders during the lull in demand through 1943 and first half of last year, is an additional factor retarding delivery of essential machine tools and equipment for the sharply expanded heavy artillery, shell, truck, and other augmented war programs. These direct war subcontracts are said to represent about 20 per cent of the machinery industry's overall output.

Tool shipments have shown only slight variation each month since last August, despite the heavy influx of new demand which raised order backlogs by the close of last year to above $260 million, in contrast with $197 million on Aug. 31, last.

Industrial machinery manufacturers state deliveries on fractional horsepower electric motors are now extended 7 months, antifriction bearings can be obtained in 7 to 8 months, hydraulic equipment in 5 to 6 months, tip tools shipments extend 5 to 6 weeks, and gray iron castings, about four months. Supply of gray iron castings is said to be the most critical at this time, with many foundries producing only 25 to 30 per cent of the rate recorded a year ago, due to the industry's serious manpower problem.

Steady increase in requirements for carbide cutting tools may force further expansion in production facilities. Fourth quarter 1944 shipments of cemented carbide manufacturers were valued at $8,803,000 for all products, including tool blanks, dies, mandrels and shell cores. Shipments of blanks for turning tools, including those for shell-turning, totaled $5,761,000. Orders received for turning tools in same period totaled $5,752,000, with unfilled orders at the end of 1944 amounting to nearly $2 million.

Over 75 per cent of the current machinery and equipment output is being absorbed by the military procurement agencies. All rated orders are taken care

Breakdown of Steel Mill Product Shipments to the Machinery ool

(Net Tons)

Products†	1944*	1943	1942	1941	1940	1939	1938	1 1936
Semifinished (ingots, blooms, billets, slabs, tube rounds, sheet and tin bars)	132,500	119,974	84,212	96,024	67,268	. .	. .	. .
Structural shapes and sheet piling	126,400	143,756	195,800	197,299	143,245	98,790	59,649	15 21,96
Plates (universal and sheared)	454,300	434,900	553,705	450,735	332,227	187,491	107,971	28 85,93
Rails—60 lbs. and over	2,400	2,014	2,177	2,211	. . . .	. . . .	. .	. .
All other rails	1,500	1,620	5,061	4,133	. .	. .	. .	. .
Total rails	3,900	3,634	7,238	6,344	2,183	1,583	876	1,88
Tie plates and track accessories (incl. track spikes)	200	106	250	131	410	120	17	17
Hot-rolled bars (carbon, incl. hoops and bands)	464,000	456,375	373,257	347,493	305,320	. . . .	. .	. .
Concrete reinforcing bars	. .	. .	. .	. .	1,233	630	630	1 9,23
Alloy bars	98,000	113,868	79,488	98,766	101,002	. . . .	. .	. .
Cold finished (carbon and alloy)	174,700	182,517	151,725	197,438	. .	. .	. .	. .
Total bars	736,700	752,760	604,470	643,697	407,555	295,456	173,545	49 35,51
Pipe and tubes	230,500	220,403	252,421	227,617	134,366	60,606	70,617	14 24,47
Wire rods	43,000	52,401	41,752	62,847	45,172	. .	. .	. .
Wire and wire products (incl. fence posts)	84,500	102,057	80,332	102,540	55,980	65,405	38,600	7 70,26
Black plate	5,500	3,633	1,058	2,965	2,009	4,116	1,963	2,93
Tin and terne plate (hot and cold-reduced)	3,300	8,830	568	5,754	3,792	. . . .	. . . .	. . . .
Sheet and strip:								
Hot-rolled	460,900	368,596	375,892	522,751	355,797	. . . .	. . . .	. . . .
Cold-reduced	178,900	111,532	109,615	178,484	117,065	. . . .	. . . .	. . . .
Galvanized	9,600	4,901	9,882	24,023	11,608	11,253	9,514	1 15,51
All other	. .	39,913	52,939	163,252	153,513	. .	. .	. .
Total	649,400	524,942	548,328	888,510	637,983	468,663	267,373	57 18,79
Tool steel bars	19,500	23,855	32,721	58,540	18,355	. . . .	. . . .	. . . .
Wheels and axles	6,200	12,204	11,638	8,250	4,555	. . . .	. . . .	. . . .
Forgings	. . . .	69,663	58,250	54,361	. .	. . . .	. .	. .
Steel castings	. . . .	45,362	48,377	38,922	. .	. .	. .	. .
All other steel products	360	7,254	9,329	18,019	30,308	71,883	21,996	4 54,62
Grand Total	2,496,260	2,525,734	2,530,449	2,862,825	1,885,408	1,254,113	742,606	1,78 16,55

†Includes steel for electrical tools and equipment. *Estimated.

of in the remainder of the available capacity.

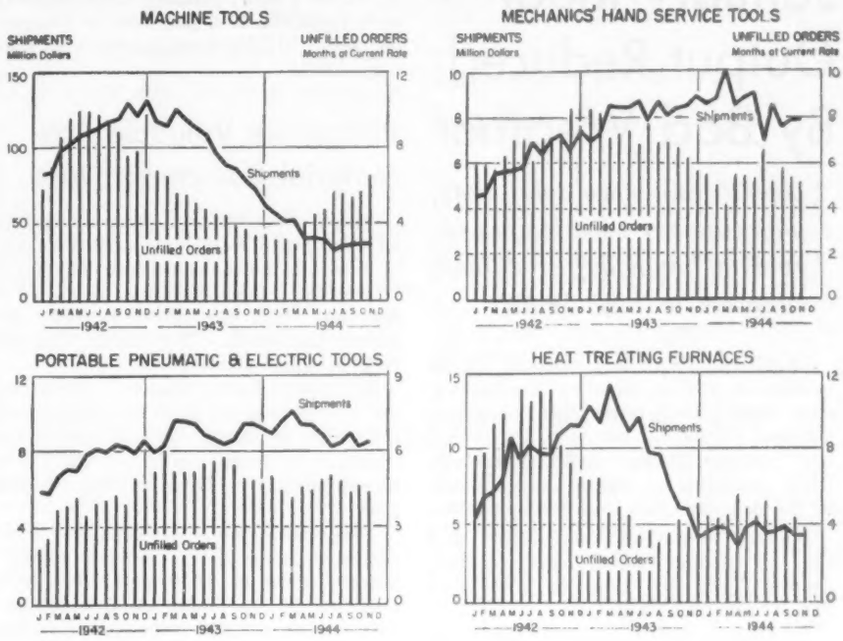
The surge in industrial equipment requirements has forced many machinery manufacturers to seek directives on delivery of components and raw materials to meet the expanded production schedules. This situation, combined with similar sharp upturn in needs of other war industries, has somewhat disorganized Controlled Materials Plan procedure in the orderly distribution of raw materials for war and essential civilian goods production.

The trend in distribution of steel products to the machinery and tool builders from 1926 through 1944 is shown in the adjoining table. These data include purchases of steel by manufacturers of primary sources of industrial motive power, such as steam engines, steam turbines, water wheels and turbines, internal combustion engines (except for automotive, aircraft or marine use); all materials for use in making machinery or machine parts, which are employed in industrial activities (except agriculture or railroads). These cover such items as lathes, planers, presses, automatic screw machines, road-building, woodworking, printing, sugar mill, baking and candy making machinery, cranes, air compressors, blowers, pumps and machines for forming, bending, drilling, grinding, pulverizing, reaming, sawing, etc. Included are materials used by makers of industrial machine parts, accessories and supplies, including chisels, axes, hatchets, cutting dies, files, rasps, saws, drills, reamers, wrenches, vises, hammers, punches, etc. Material for use in the manufacture of electric motors, generators, dynamos, transformers, etc.; all direct sales to radio and wireless companies and their suppliers; also sales used in making towers, conduits, and other kinds of electrical apparatus and supplies, are also included.

Distribution of steel to the above group of manufacturers recorded little change in 1944 over the preceding two years, estimated at about 2,496,260 net tons. This compares with 2,525,734 and 2,530,449 tons, purchased by the group in 1943 and 1942, respectively.

Expressed in percentage of total steel mill shipments, the machinery and tool industry received 4.1 per cent of overall steel shipments in 1944, compared with 4.2 and 4.0 per cent in the two preceding years.

MACHINE SHOP AND FOUNDRY EQUIPMENT



ool Manufacturers by Product Classification from 1926 through 1944

(Net Tons)

1936	1935	1934	1933	1932	1931	1930	1929	1928	1927	1926
21,961	63,977	58,634	25,564	27,748	52,212	89,562	102,308	89,451	52,231	68,283
85,937	134,886	75,208	60,878	53,640	93,776	145,938	192,762	113,960	54,413	77,001	
							1,667	665	664	1,185
							951	1,516	25	1,609
1,880	1,014	615	485	143	1,010	4,145	2,618	2,181	689	2,794
179	243	253	167	267	144	452	287	150	139	103
9,231	15,397	2,345	2,298	2,537	4,132	8,474				
35,510	322,676	149,136	190,001	111,034	210,342	368,177	554,319	453,940	377,409	520,007
24,471	44,274	63,382	29,957	28,946	50,783	48,635	120,307	95,061	33,684	2,513
70,261	43,026	35,436	24,801	17,012	13,996	30,048	29,860	30,210	29,679	36,956
2,938	1,460	2,239	1,076	697	333	2,894	5,177	2		
15,510	12,106	6,832	5,018	3,086	5,863	15,552	3,724	45,441		
18,792	391,351	253,015	216,976	108,347	218,800	373,511	490,609	317,384	22,707	103,395
54,626	16,265	10,769	8,624	5,612	15,932	34,002	42,393	21,121	40,005	61,641
16,555	1,019,171	648,687	558,528	353,446	657,337	1,097,365	1,540,640	1,123,461	610,957	872,694

Figures for 1926-39 compiled by STEEL; for 1940-43 by American Iron and Steel Institute.

January Ingot Output Reduced By Bad Weather

Lowest total since July, 1942, with capacity percentage near rate at beginning of defense program in July, 1940

DEEP snow and bad weather during January in several important steelmaking areas were mainly responsible for reducing steel output last month to the lowest total for any 31-day month since July, 1942, according to figures just released by the American Iron and Steel Institute.

January output of steel ingots and steel for castings totaled 7,178,315 tons, against 7,361,191 tons in December and 7,586,740 tons in January, 1944.

Production during January was at an average of 90.1 per cent of capacity rated at midyear, 1944. Since then capacity has been increased and when new capacity ratings as of Jan. 1, 1945, are released it is expected that the January output will represent about 88.5 per cent of current capacity. The latter rate would be the lowest monthly since the 83 per cent rate of July, 1940, when the national defense program was getting under way.

By comparison, output in December, 1944, was at 92.6 per cent of the July 1 capacity and production in January, 1944, was at 95.6 per cent of the then available capacity.

During January, steel output averaged 1,620,387 tons per week, compared with 1,665,428 tons per week in December and 1,712,582 tons per week in January, 1944.

Philippines Valuable Raw Material Source for Japs

When deprived of the Philippine Islands, Japan will lose large tonnages of iron ore, chrome ore and manganese which her steel industry needs, the American Iron and Steel Institute reported last week. The islands also are rich in other natural resources.

In 1940, Japan obtained 1,310,805 net tons of iron ore from the Philippines, the entire production of iron ore in the islands. In seven months of 1941 iron ore shipments to Japan totaled 945,300 tons.

Presumably, since the Japanese occupation in early 1942, tonnages approximating those of 1940 and 1941 have been shipped to Japan, along with manganese ore which prior to the Japanese invasion was shipped almost entirely to the United States. In 1940, shipments of manganese ore from the Philippines into this country were around 50,000 tons.

The commercial mining of chrome ore started only about 15 years ago in the Philippines. In 1938 around 74,000 net tons were exported, of which 60,000 tons were shipped to the United States, 8000 tons to Canada and 2000 tons to Japan. One of the principal producing areas is the Zambeles province of Luzon.

Four companies produced most of the 1940 output of iron ore in the Philippines. They were the Philippine Iron Mines Inc., in the Larap peninsula, in Camarines Norte; Samar Mining Co. Inc., in Harnani, Samar; Baracale Iron Mines in Camarines Norte; and Gold Star Mining Co. Inc., in Mogpog, Marinduque. The total ore reserves of the four companies are estimated at around 8,000,000 tons, according to a prewar report of the United States Department of Commerce.

Steel Corp. Shipments Lowest Since June, 1943

Shipments of finished steel by the United States Steel Corp. in January totaled 1,569,115 net tons, a decrease of 198,485 tons from December deliveries and of 161,672 tons from shipments in January, 1944. This is the smallest total for January since 1940, when the figure was 1,145,592 tons and lowest for any month since June, 1943. Comparisons are shown in the accompanying tabulation.

(Inter-company shipments not included)

	Net Tons			
	1945	1944	1943	1942
Jan.	1,569,115	1,730,787	1,658,992	1,738,893
Feb.	.....	1,755,772	1,691,592	1,616,587
Mar.	.....	1,874,795	1,772,397	1,780,938
Apr.	.....	1,756,797	1,630,828	1,758,894
May	.....	1,776,934	1,706,543	1,834,127
June	.....	1,737,769	1,552,663	1,774,068
July	.....	1,754,525	1,660,762	1,765,749
Aug.	.....	1,743,485	1,704,289	1,788,650
Sept.	.....	1,733,602	1,664,577	1,703,570
Oct.	.....	1,774,969	1,794,968	1,787,501
Nov.	.....	1,743,753	1,660,594	1,665,545
Dec.	.....	1,767,600	1,719,624	1,849,635
Total	.....	21,150,788	20,244,830	21,064,157
Adjustment	.....	.....	•97,214	•449,020
Total	.....	.....	20,147,616	20,615,137

•Decrease.

STEEL INGOT PRODUCTION STATISTICS

	Estimated Production—All Companies								Calculated weekly production, all companies Net tons	Number of weeks in mo.
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.		
Based on reports by companies which in 1943 made 98.3% of the open hearth, 100% of the bessemer and 87.9% of the electric ingot and steel for castings production										
1945										
Jan.	6,457,788	92.3	379,104	73.7	341,423	75.0	7,178,315	90.1	1,620,387	4.43
1944										
Jan.	6,769,438	97.2	439,551	85.4	377,751	83.3	7,586,740	95.6	1,712,582	4.43
Feb.	6,409,981	98.4	409,781	85.2	368,555	87.0	7,188,317	96.9	1,736,308	4.14
March	6,976,450	100.1	455,368	88.5	388,408	85.7	7,820,226	98.5	1,765,288	4.43
1st qtr.	20,155,869	98.6	1,304,700	86.4	1,134,714	85.3	22,595,283	97.0	1,738,099	13.00
April	6,788,433	100.6	437,472	87.8	362,118	82.5	7,588,023	98.7	1,768,770	4.29
May	6,878,251	98.7	437,444	85.0	380,960	84.0	7,696,655	97.0	1,737,394	4.43
June	6,462,108	95.8	419,699	84.2	347,028	79.0	7,228,835	94.1	1,685,043	4.29
2nd qtr.	20,128,792	98.4	1,294,615	85.6	1,090,106	81.9	22,513,513	96.6	1,730,478	13.01
1st hlf.	40,284,661	98.5	2,599,315	86.0	2,224,820	83.6	45,108,796	96.8	1,734,287	26.01
July	6,742,830	96.5	415,543	80.9	334,710	73.7	7,493,083	94.2	1,695,268	4.42
Aug.	6,714,857	95.9	429,672	83.5	348,901	76.6	7,493,430	94.0	1,691,519	4.43
Sept.	6,500,997	96.1	398,058	80.0	330,837	75.2	7,229,892	93.9	1,689,227	4.28
3rd qtr.	19,958,684	96.2	1,243,273	81.5	1,014,448	75.2	22,216,405	94.1	1,692,034	13.13
9 mos.	60,243,345	97.7	3,842,588	84.5	3,239,268	80.8	67,325,201	95.9	1,720,112	39.14
Oct.	6,859,922	98.0	420,105	81.6	335,526	73.7	7,615,553	95.6	1,719,086	4.43
Nov.	6,571,497	96.9	403,908	81.0	298,503	67.7	7,273,908	94.3	1,691,966	4.29
Dec.	6,677,488	95.6	373,323	72.7	310,380	68.3	7,361,191	92.6	1,665,428	4.42
4th qtr.	20,108,907	96.9	1,197,336	78.4	944,409	69.9	22,250,652	94.1	1,693,353	13.14
2nd hlf.	40,067,591	96.5	2,440,609	80.0	1,958,857	72.6	44,467,057	94.1	1,692,693	26.27
Total	80,352,252	97.5	5,039,924	83.0	4,183,677	78.0	89,575,853	95.4	1,713,387	52.28

The percentages of capacity operated are calculated on weekly capacities of 1,572,755 net tons open hearth, 116,182 net tons bessemer and 102,350 net tons electric ingots and steel for castings, total 1,791,287 net tons; based on annual capacities as of Jan. 1, 1944 as follows: Open hearth 82,223,610 net tons, bessemer 6,074,000 net tons, electric 5,350,880 net tons. Beginning July 1, 1944, the percentages of capacity operated are calculated on weekly capacities of 1,580,042 net tons open hearth, 116,182 net tons bessemer and 102,757 net tons electric ingots and steel for castings, total 1,798,981 net tons; based on annual capacities as follows: Open hearth 82,604,600 net tons, bessemer 6,074,000 net tons, electric 5,372,150 net tons.

Steel Industry's Expansion In 1945 To Cost $204 Million

Steel companies will have spent by the end of 1945 more than $1,310,000,000 of their own funds to expand and modernize plants and properties for wartime production, the American Iron and Steel Institute reported last week. This total is over and above the nearly $1,095,000,000 in government money which has been spent for steel plant expansion during the war. Thus the total cost of expanding the steel industry for the war effort exceeded $2,405,000,000—more money than the total expenditures of the United States government in the fiscal year ending June 30, 1917.

For 1945, steel companies estimate they will spend $204 million of their own funds. Government expenditures are expected to decline to about one-tenth the amount of the companies' expenditures.

Actual expenditures by the steel companies in 1944, $136 million (the government invested $143 million) fell about 20 per cent short of the amount which they had estimated a year ago that they would spend during the year.

Steel Payrolls Record Breaking

Total for 1944 exceeds $1,745 million, almost $96 million more than previous peak year, 1943. Hourly and weekly earnings also at new peaks

TOTAL payrolls of steel companies in 1944 were record breaking at $1,745,019,700, almost $96 million more than the previous peak of $1,649,227,000 paid out in 1943, according to data released last week by the American Iron and Steel Institute.

The 1944 total includes payment of part of the retroactive wage increases called for by the War Labor Board decision late last year in the steel wage case.

Hourly and weekly earnings of wage earners also set a new record last year, averaging 121.9 cents per hour and $56.93 per week over the entire year. In 1943, hourly earnings averaged 113.5 cents and weekly earnings $48.81.

Average employment in steel plants declined in 1944, however, although output last year exceeded the 1943 tonnage. Over the whole year, average employment was 571,200, as against total employment of 626,000 in the preceding year.

The number of hours worked per week by wage earners averaged 46.7 during 1944, compared with 43.0 hours per week in 1943.

In December of last year, steel payrolls totaled $139,894,000 as against $143,136,800 in November and $140,202,700 in December, 1943. Employment averaged 563,900 in December, 1944, compared with 564,200 in November and 604,700 in December, 1943.

Wage earners received an average of 119.7 cents per hour in December of last year, 120.2 cents per hour in November and 116.1 cents per hour in December, 1943. Hours worked weekly in the closing months of 1944 averaged 45.0, compared with 47.7 in November and 43.2 in December, 1943.

Colorado Fuel & Iron Has Net of $1,036,187

Net profit of Colorado Fuel & Iron Corp., Denver, totaled $1,036,187, or $1.84 a common share, for the six months ended Dec. 31 last. This compares with $525,941, equal to 93 cents a share, in the corresponding 1943 period. In the final quarter last year the company earned $611,710, against $446,704 in December, 1943, quarter.

Acme Steel Earns 1944 Profit of $1,909,663

Acme Steel Co., Chicago, had 1944 net income of $1,909,663, equal to $5.82 a share on capital stock, compared with $1,994,646, or $6.08 a share, in preceding year. Fourth quarter net totaled $556,274, against $578,874 in same 1943 period.

Iron and Steel Products Made for Sale in 1944

AMERICAN IRON AND STEEL INSTITUTE
CAPACITY, PRODUCTION AND SHIPMENTS

Period DECEMBER - 1944

Steel Products	Number of companies	Items	Maximum Annual Potential Capacity Net Tons	Current Month: Production Net Tons	Current Month: Production Per cent of capacity	Current Month: Shipments (Net Tons) Total	Current Month: Shipments (Net Tons) To members of the industry for conversion into further finished products	To Date This Year: Production Net Tons	To Date This Year: Production Per cent of capacity	To Date This Year: Shipments (Net Tons) * Total	To Date This Year: Shipments (Net Tons) * To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	51	1	xxxx	xxxx	xxx	680,817	199,143	xxxx	xxx	8,701,186	2,747,778
Structural shapes (heavy)	11	2	9,429,250	321,526	42.7	302,462	xxxx	3,834,708	42.1	3,835,601	xxxx
Steel piling	4	3		18,472		21,204	xxxx	137,662		132,513	xxxx
Plates (sheared and universal)	27	4	17,583,220	868,919	58.5	864,807	45,415	13,192,660	75.0	12,866,213	625,061
Skelp	6	5	xxxx	xxxx	xxx	68,996	60,062	xxxx	xxx	839,189	668,274
Rails—Standard (over 60 lbs.)	4	6	3,625,000	188,664	61.6	195,200	xxxx	2,305,303	63.6	2,290,779	xxxx
—All other	6	7	526,000	12,529	28.2	13,657	xxxx	185,878	35.3	192,671	xxxx
Splice bars and tie plates	13	8	1,747,260	52,049	35.2	54,108	xxxx	769,949	44.1	789,285	xxxx
Track spikes	10	9	350,640	12,386	41.8	13,163	xxxx	147,376	42.0	156,260	xxxx
Hot Rolled Bars—Carbon	39	10	xxxx	675,024	xxx	554,362	80,068	8,658,581	xxx	7,121,278	933,526
—Reinforcing—New billet	15	11	xxxx	54,928	xxx	63,391	xxxx	543,628	xxx	573,998	xxxx
—Rerolled	14	12	xxxx	3,898	xxx	4,064	xxxx	67,342	xxx	79,524	xxxx
—Alloy	25	13	xxxx	241,759	xxx	175,867	18,055	3,064,638	xxx	2,241,525	237,667
—Total	47	14	22,264,720	975,609	51.8	797,684	98,123	12,334,189	55.4	10,016,325	1,171,193
Cold Finished Bars—Carbon	24	15	xxxx	141,557	xxx	139,527	xxxx	1,786,599	xxx	1,775,046	xxxx
—Alloy	23	16	xxxx	29,308	xxx	24,885	xxxx	413,854	xxx	372,927	xxxx
—Total	30	17	2,940,910	170,865	68.7	164,412	xxxx	2,200,453	74.8	2,147,973	xxxx
Tool steel bars	17	18	271,460	12,658	55.2	12,577	xxxx	147,369	54.3	141,684	xxxx
Pipe and Tubes—Butt weld	16	19	2,162,520	116,910	63.9	122,235	xxxx	1,435,674	66.4	1,437,910	xxxx
—Lap weld	8	20	842,200	45,599	64.0	46,306	xxxx	577,602	68.6	574,242	xxxx
—Electric weld	10	21	1,344,900	73,273	64.4	75,742	xxxx	859,929	63.9	857,119	xxxx
—Seamless	15	22	2,678,100	180,117	79.6	191,963	xxxx	2,336,555	87.2	2,356,483	xxxx
—Conduit	7	23	187,000	7,051	44.6	6,524	xxxx	63,596	34.0	63,489	xxxx
—Mechanical tubing	12	24	1,117,600	65,375	69.2	59,994	xxxx	826,542	74.0	805,421	xxxx
Wire rods	27	25	7,058,470	362,464	60.7	98,304	32,927	4,610,251	65.3	1,365,127	435,453
Wire—Drawn	42	26	5,653,440	285,720	59.8	179,781	9,575	3,652,728	64.6	2,178,345	104,294
—Nails and staples	19	27	1,249,020	46,413	44.0	48,262	xxxx	642,497	51.4	635,388	xxxx
—Barbed and twisted	15	28	546,390	20,276	43.9	20,924	xxxx	253,788	46.4	251,990	xxxx
—Woven wire fence	16	29	1,106,200	31,937	34.2	32,354	xxxx	384,879	34.8	382,202	xxxx
—Bale ties	12	30	152,500	5,167	40.1	5,198	xxxx	75,235	49.3	76,156	xxxx
Black Plate—Ordinary	9	31	xxxx	xxxx	xxx	34,820	239	xxxx	xxx	489,222	1,504
—Chemically treated	8	32	464,000	6,999	17.8	7,226	xxxx	126,950	27.4	120,695	xxxx
Tin and Terne Plate—Hot dipped	9	33	3,718,850	165,545	52.7	172,844	xxxx	1,992,276	53.6	2,000,317	xxxx
—Electrolytic	10	34	2,173,850	58,567	31.9	61,043	xxxx	649,556	29.9	604,968	xxxx
Sheets—Hot rolled	29	35	19,536,820	1,109,461	67.2	508,791	30,255	12,865,583	65.9	6,413,344	300,965
—Cold rolled	12	36	7,072,260	371,507	62.1	194,157	xxxx	3,826,140	54.1	2,031,477	xxxx
—Galvanized	16	37	2,892,130	132,394	54.1	129,108	xxxx	1,389,866	48.1	1,378,077	xxxx
Strip—Hot rolled	23	38	7,117,390	210,405	35.0	130,511	17,058	2,671,962	37.5	1,703,148	264,621
—Cold rolled	36	39	3,146,110	113,312	42.6	103,253	xxxx	1,270,281	40.4	1,191,365	xxxx
Wheels (car, rolled steel)	5	40	319,400	25,687	95.1	25,839	xxxx	300,429	94.1	296,495	xxxx
Axles	6	41	408,170	8,711	25.2	10,162	xxxx	186,921	45.8	184,726	xxxx
All other	5	42	168,790	4,146	29.1	3,705	xxxx	48,018	28.4	46,523	xxxx
TOTAL STEEL PRODUCTS	155	43	xxxx	xxxx	xxx	5,458,133	492,797	xxxx	xxx	69,553,911	6,319,143
Effective steel finishing capacity	155	44	64,722,000	xxxx	xxx	xxxx	xxxx	xxxx	xxx	xxxx	xxxx
Percent of shipments to effective finishing capacity	155	45	xxxx	xxxx	xxx	90.7 %	xxxx	xxxx	xxx	97.7%	xxxx

During 1943 the companies included above represented 98.9% of the total output of finished rolled steel products as reported to American Iron and Steel Institute.

* Adjusted.

OPA Advances Pig Iron $1 Based On Study of Production Costs

All grades except charcoal iron marked up as of Feb. 14 in first adjustment in market since December, 1940. Re-examination of earnings of producers to be made within six months to determine the effect of the increase

STEADILY rising production costs of pig iron producers were recognized last week by the Office of Price Administration in permitting an increase of $1 per gross ton in ceiling prices on all grades of pig iron, except charcoal iron.

The price increase was effected as of Feb. 14. (See page 173 for new price quotations.)

This is the first price adjustment in pig iron since December, 1940, when the trade raised prices $1 a ton. Controls over pig iron prices were established by OPA on June 24, 1941.

The price increase established through amendment No. 10 to RPS-10, leaves the silicon, phosphorus, manganese, and nickel differentials unchanged.

Struthers Iron & Steel Co., Struthers, O., has been granted permission to continue to charge 50 cents a ton in excess of the basing point prices for No. 2 foundry, basic, bessemer and malleable. It is understood Pittsburgh Coke & Iron Co. is dismantling its Sharpsville, Pa., furnace, so a permitted 50 cents a ton extra no longer applies at that point.

OPA's survey of operating costs embraced 10 wholly merchant producers operating 23 furnaces. Average total operating costs for these companies rose from $17.89 per gross ton in the first quarter of 1941 to $22.68 a ton at present, an increase of $4.79 per gross ton (exclusive of any increases resulting from the basic steel wage award).

Most important factors in this trend were increases in the cost of coke ($2.70 per gross ton of pig iron), conversion ($1.14 per ton of iron) and ore ($0.76 per ton of iron).

Although this increase in costs was offset partially by an average increase in realization of $1.62 per gross ton during the period owing to changes in product mix, increases in premiums for chemical analysis authorized by OPA, and reductions in absorption of freight, the overall return from pig iron sales of the 10 companies has shown a steady downward trend. From a peak in 1941 of 13.8 per cent of net worth, the earnings of the 10 companies have declined to a current rate of about 2 per cent of net worth.

The information obtained from the companies studied seems to indicate the price adjustment may raise the rate of return of the merchant pig iron industry somewhat above that during the base period, OPA states. Other factors, however, have led OPA to the belief that relief was called for. Costs have been steadily rising. The most recent data in OPA's analysis are for the third quarter of 1944 and the cost increases which apparently have accrued in the five months since would further affect computation if they could be accurately and currently measured, OPA officials said. A re-examination of the earnings of the industry will be undertaken in the next six months to measure the effect of the OPA action.

The pig iron price increase cannot be passed on by iron consumers, OPA said.

WLB Ore Wage Panel Report Patterned on Steel Ruling

The majority of a six-member fact-finding panel of the War Labor Board last week ruled that the facts in the iron ore wage case are similar to those in the steel wage case under which the board has granted a wage increase to 400,000 steelworkers.

Some detailed differences between the two industries were noted by the panel in discussing union proposals for severance pay and paid vacations for about 25,000 men in the iron ore industry. The panel has no power to make recommendations.

Its report, in which the two industry members dissented, will be considered by the board in deciding the United Steelworkers-CIO demand that the same "fringe" awards made to steelworkers be given the men employed by the 44 ore mining companies in the Lake Superior region. These increases include shift differentials, vacations with pay and liberalized holiday pay. The union's demand for a straight wage increase of 17 cents an hour was not granted.

"In so far as the issues between the parties to the case involved questions of the policy or the authority of the board," the panel's report said, "such questions have been settled so far as this panel is concerned by the material provisions of the board's directive order in the steel case on Nov. 25, 1944."

Steel Castings Industry Group Honored for Service to OPA

MEMBERS of the Steel Castings Industry Advisory Committee to the Office of Price Administration were presented with certificates of meritorious service at a luncheon at the Edgewater Beach hotel, Chicago, Feb. 13, on the concluding day of a two-day conference with OPA executives.

This was only the second instance in which an award for distinctive service has been given to an industry advisory group, the first being the one to the Scrap Industry Advisory Committee recently.

Presentation was made by Rae E. Walters, regional administrator, OPA, Chicago, on behalf of Chester Bowles, OPA administrator, Washington.

Advisory committee members present to receive the certificates were: C. L. Harrell, vice president, Sterling Steel Casting Co., East St. Louis, Ill., chairman of the committee; J. A. Sauer, president, Symington-Gould Corp., Rochester, N. Y., vice chairman; C. L. Snowdon Jr., vice president and secretary, Reliance Steel Casting Co., Pittsburgh, secretary-treasurer; George Alston, secretary-treasurer, General Steel Castings Corp., Eddystone, Pa.; N. K. Anderson, president, Alloy Steel & Metals Co., Los Angeles; E. E. Burk, assistant to works manager, Commercial Steel Castings Division, Otis Elevator Co., Buffalo; Herbert Farrell Jr., vice president, Farrell-Cheek Steel Co., Sandusky, O.; M. A. Fladoes, president, Sivyer Steel Casting Co., Milwaukee; T. H. Harvey, vice president, Ohio Steel Foundry Co., Lima, O.; A. J. McDonald, vice president, American Steel Foundries, Chicago; F. M. Robbins, president, Ross-Meehan Foundries Inc., Chattanooga, Tenn.; Thomas H. Shartle, president, Texas Electric Steel Casting Co. Inc., Houston, Tex.; and Clarence Tolan Jr., president, Dodge Steel Co., Philadelphia.

Not present but awarded certificates were two other committee members: C. W. Howat, district sales manager, Continental Foundry & Machine Co., Pittsburgh; and L. C. Wilson, general manager, Reading Steel Casting Division, American Chain & Cable Co. Inc., Reading, Pa.

Representatives of OPA attending the meeting and conferring with the advisory committee included: Weldon Welfling, chief of castings section, Iron and Steel Branch, OPA, Washington, and Warren M. Huff, price executive, Iron and Steel Branch, OPA, Washington.

Among guests attending the luncheon were Oliver E. Mount, secretary-treasurer, American Steel Foundries, Chicago, formerly a member of the advisory committee and its original chairman; and D. D. Kennedy, formerly price executive, Iron and Steel Branch, OPA, Washington, and now assistant general manager, Farrell-Cheek Steel Co., Sandusky, O.

Milwaukee District Foundrymen Press War Production Efforts

Discussions at eighth annual area conference center around problems directly concerned with stepping up output of castings for war use. Technological advancement within industry provides subjects at various group sessions

MILWAUKEE

CONFRONTED with a difficult manpower shortage and other problems peculiar to wartime operations, foundrymen in the Milwaukee district are exerting every possible effort to increase their production of castings for the war effort, it was indicated at the various sessions of the eighth annual foundry conference in Milwaukee, Feb. 8-9.

The conference, sponsored jointly by the Wisconsin chapter, American Foundrymen's Association and the College of Engineering, University of Wisconsin, was attended by approximately 600 representatives of the industry from the area.

At the opening session Dean F. Ellis Johnson, College of Engineering, University of Wisconsin, welcomed those attending and discussed the furthering of technological advances in the foundry industry.

Prof. Don Lescohier, University of Wisconsin, spoke on "Current Wage Problems" at the luncheon Feb. 8 at which Harry E. Ladwig, Allis-Chalmers Mfg. Co. and president, Wisconsin chapter, AFA, presided. Professor Lescohier traced the parallel rise in wages and in worker productivity over a long period of years, and pointed out that maintenance in the postwar period of current high wartime wages or of further increases over present levels is dependent on the future trend in output per worker.

Dr. Ralph L. Lee, General Motors Corp., Detroit, was the principal speaker at the luncheon, Feb. 9, with R. C. Woodward, Bucyrus-Erie Co., Milwaukee, presiding. Dr. Lee spoke on "Humanics in the Foundry," stating that since groups are composed of individuals possessing different characteristics, the proper approach is to make man-to-man contact.

The first session Feb. 7, held under the direction of C. W. Morisette, Milwaukee Vocational School, was devoted to a discussion of responsibility in apprenticeship by Dr. William F. Rasche, Milwaukee Vocational School; William F. Patterson, War Manpower Commission, Washington, and C. W. Wade, Caterpillar Tractor Co., Peoria, Ill.

Mr. Patterson, while complimenting foundrymen on the miraculous war job they have done, said production must be further increased, and that just now the time element is particularly important. He said the foundry industry must carry on the apprenticeship program in the best possible way and that best results can be secured by co-operation of industry with municipal, state and federal agencies. Need for more apprentices is indicated, he said, by the fact that in 1910 the average age of molders was 35 years but by 1940 it had increased to 42½ years, also, that in 1910 apprentices constituted 6 per cent of those in molding while in 1940 they had dropped to 1.8 per cent.

Sectional technical meetings of the various branches of the industry began the afternoon of Feb. 8 and continued through Feb. 9. Sessions were devoted to gray iron, steel castings, malleable castings, nonferrous castings and pattern-making. Concluding session was a general meeting on centrifugal castings.

W. H. Colvin Elected Crucible Steel Head

William H. Colvin Jr., for nine years president of Rotary Electric Steel Co., Detroit, has resigned to become president of Crucible Steel Co. of America, New York. He succeeds Joseph H. Callan who becomes chairman of the executive committee at Crucible.

L. E. Creighton, who has been vice president in charge of sales at Rotary, has been elected chairman of the board of that company. N. D. Devlin, vice president in charge of operations, becomes president, and John T. Abbott and L. L. Ferrall become vice presidents in charge of sales and metallurgy, respectively. Rotary Electric Steel was organized about 1930 to make steel from scrap and cast it in a special type of rotating circular mold. The process later was replaced with conventional pouring and rolling equipment. Two electric furnaces provide capacity of about 170,000 tons a year.

POSTWAR PREVIEWS

WESTERN STEEL—Competition for acquisition of war-born plants heartens Pacific states. Railroads indicate freight rates will be no barrier to postwar operation of Geneva Steel. Government officials studying formula and procedure for disposing of government-owned facilities. See page 75.

PACIFIC RIM EXPORTS—Economist warns West Coast not to lean too heavily on exports to solve problems of postwar period, but sees foreign trade as important factor in region's future. See page 84.

LIGHT METALS—Senate small business committee to investigate possibilities of utilizing government-owned aluminum and magnesium plants. See page 86.

AUTOMOTIVE—Graham-Paige expects to market $80 million worth of automobiles, $50 million in farm implements in early postwar years. See page 92.

SHIPBUILDING—Few Pacific Coast yards interested in buying government-owned facilities for postwar operation or conversion to other manufacturing. See page 97.

RAILROAD EQUIPMENT—Pullman-Standard Car Mfg. Co. planning manufacture of newly designed cars embodying revolutionary concepts of passenger accommodations. See page 102.

SPOT WELDER FORGING—Unusual forging and welding jobs accomplished with precise automatic control of pressure and current cycles illustrate possibilities for new resistance welding systems. See page 106.

BRIGHT ANNEALING—Longest continuous salt-bath line for full annealing 6000 pounds of brass cartridge cases per hour affords unequaled absence of oxidation, reduced costs and greater speed. See page 130.

LEADED STEELS—Improved machinability of steel containing a small quantity of lead is increasing shop efficiency substantially. Machinability constants 24 to 35 per cent higher than with non-leaded types, gain in feed from 36 to 60 per cent, and phenomenal improvement in tool life are features. See page 136.

Economist Warns West Coast Must Not Lean Too Heavily on Exports

Foreign trade will make important contribution to Pacific industry, but will not solve all problems. Promotion of trade in specialized products, services, and careful development of seaports and airports advised

"I SHOULD like to be able to say that foreign trade will provide a solution to the difficulties which the West Coast will face during the transition from war to peace," Dr. August Maffry, head of the International Economy and Statistics Unit, Department of Commerce, testified during recent hearings before the Senate special committee to investigate industrial centralization.

"Foreign trade can and should make an important contribution to the solution of these difficulties. But it would be wrong to assume that the answer to our reconversion problems can be found outside the United States."

As a starter, said Dr. Maffry, West Coast businessmen should concentrate on those products for which they had good export markets before the war, namely grains and grain products, forest products, fruits and vegetables, petroleum products, chemicals, and meat and fish products. Some elements of a positive foreign trade program for the West Coast, he said, are:

"1. Every effort should be made to develop specialized export products in which labor cost is high relative to material costs, which are distinctive in character, and which may be sold on a quality rather than a price basis. As an example, California sportswear has become pre-eminent in its field.

"2. The export of services as well as of commodities should be promoted in every possible way. The export of motion pictures is more than twice as important as exports of any other industry in the western part of the United States.

"3. Carefully planned development of seaports and airports to be undertaken as a means of increasing the employment provided by the movement through Pacific ports of export products originating in other parts of the country, and of import products destined for other parts of the country.

"4. Encouragement should be given to the establishment and growth of distribution facilities for imported products consumed on the West Coast. Imported products in increasing quantities can be graded, labeled, and packaged on the West Coast for distribution to the considerably larger market created by the influx of population during the war."

West Coast businessmen already are looking forward aggressively to pushing foreign trade after the war, said Dr. Maffry. An application has been received for establishment of a foreign-trade zone in San Francisco, and businessmen of that city and others are sponsoring plans for establishment of international sample fairs to be operated along lines of successful European international sample fairs of the past. Samples of both domestic and foreign products will be exhibited to stimulate buying and selling.

Dr. Maffry could not agree with those who fear that the increase in population on the West Coast due to wartime employment at airplane and shipbuilding plants carries a threat of postwar unemployment. Rather, he said, it carries a promise of a much larger local market for West Coast manufacturers. In the long run, he said, it will give great impetus to industrialization of the Far West.

The West Coast cannot be disassociated from the rest of the country in looking at foreign trade prospects, said Dr. Maffry; whatever promotes foreign trade for the country as a whole will help the West Coast. There are only two ways of increasing exports, he reminded the committee: One is to import more and the other is to invest American capital abroad.

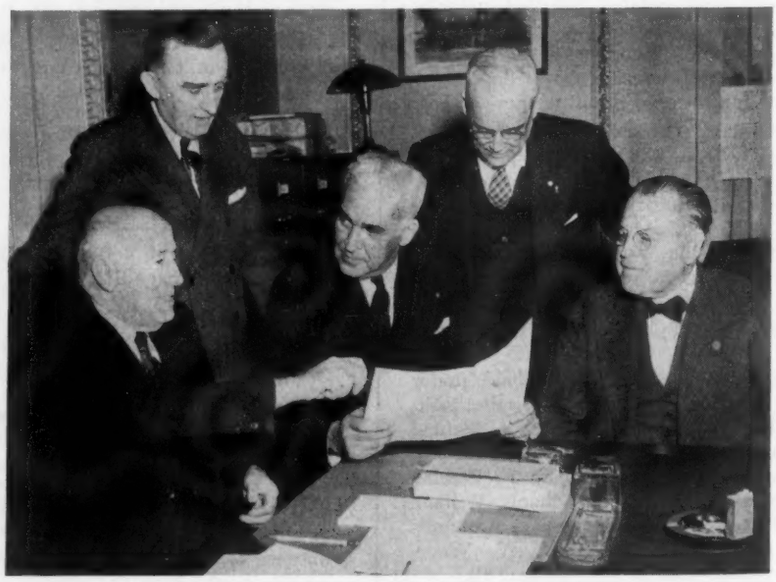
In the event of a high level of employment and production after the war, said Dr. Maffry, our imports probably would come to approximately $6 billion a year in terms of 1942 prices, and this level of imports should support an annual export movement of about $7 billion. On the basis of the prewar statistics, that would give the West Coast an export business of about $850 million a year as compared with $360 million in 1936-1938.

A well-rounded program of foreign investments, said Dr. Maffry, might increase our postwar export by another $2 billion to $9 billion a year. Such a program, he thought, would necessitate use of the proposed International Bank for Reconstruction and an enlarged Export-Import Bank. Under such conditions, he said, the West Coast might enjoy an export trade three to four times as large as it had before the war.

Chinese Market Uncertain

The extent of the Chinese market in the years immediately following the war, said Dr. Maffry, will depend very largely on the rate of new foreign investment, mainly American investment, in China.

"One factor of enormous importance," he said, "is the disappearance of extra-territorial rights in China. American firms operating in that country will not function as before the war under American law and the jurisdiction of the United States Court for China, but will be under the jurisdiction of Chinese courts. Until revision of China's commercial laws is accomplished, and regulations issued by appropriate ministries of the Chinese government, it will not be possible for American business to plan definitely with knowledge of the terms under which foreign firms can operate, of the



JOB DRAFT CONFERENCE: Paul V. McNutt, war manpower commissioner, confers with senators on national service legislation. Shown above are, left to right: Sen. Elbert Thomas (Dem., Utah); Sen. Joseph C. O'Mahoney (Dem., Wyo.); Mr. McNutt; Sen. Harold Burton (Rep., O.); and Sen. Warren R. Austin (Rep., N. Y.). NEA photo

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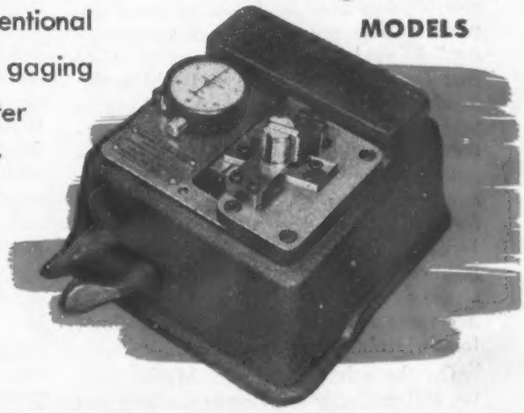

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fields which will be open to foreign investment and enterprise, or of the procedures to be followed in organizing a business or branch in China. Nor will the legal framework for our commercial relations with China be established until conclusion of a commercial treaty with that country. The Department of Commerce is working intensively on the question.

"You can hear estimates ranging all the way from $50 million to $1 billion a year for new American investment in China. Personally, I would prefer a relatively low figure—say $100 million. An economy like China's cannot absorb large amounts of foreign capital in a short time. It must also not be forgotten that industrialization is a social and political process as well as a purely economic process. In China there is a limitation fixed by the number of workers equipped and trained to use modern tools, the problem of creating such fundamental facilities as transportation and power before manufacturing on a large scale ever can be planned."

The Philippines, because of economic and political ties of long standing, are a natural market for the United States, said Dr. Maffry, but it will be necessary to pour a large amount of capital into them in order to rehabilitate industry and agriculture in those islands. The West Coast, he said, should participate on a large scale in this program. Rehabilitation of the Philippines, he said, should start quickly for the reason that the Philippine government has substantial funds in the United States, at least $350 million, for this purpose.

Entire Country Will Be Benefited

Most foreign countries, including the Philippines, said Dr. Maffry, will need products of heavy industries after the war for purposes of rehabilitation. Those sections of the country where heavy industry is located, therefore, will benefit directly to a larger extent than others from our postwar exports, but the indirect effects will benefit the entire country, he asserted.

There was considerable doubt in Dr. Maffry's mind as to our ability to fill the role formery held by Japan in world exports. "The prospect is not encouraging," he said, "because the sort of thing that Japan manufactured and sold in the export market is not the sort of thing in which the West Coast, or for that matter the United States, ordinarily competes. There are a number of other countries eager to capture the markets formerly occupied by Japanese products. India is one, China is another, Australia is another. And Brazil and Argentina already are supplying to the Latin-American market many of the products formerly obtained from Japan."

On the other hand, Dr. Maffry said, we will probably not lose in the long run by transference of export business from Japan to other low-wage countries. China, India, Australia and some of the Latin-American countries, he said, will be better markets for our products.

V. P. IN WARTIME: While President Roosevelt and other high officials were conferring with state heads of Great Britain and Russia in the Crimea, Vice President Harry S. Truman was building morale on the home front. Here he is shown rendering a piano solo for the entertainment of Lauren Bacall, movie actress perched atop the piano at the National Press Club canteen in Washington. NEA photo

Senate Small Business Committee To Study Postwar Use of Light Metals

FOLLOWING preliminary discussions over many months, the Senate Special Committee on Small Business has arranged a series of hearings, beginning Feb. 27, for full consideration of the problem of postwar utilization of the government's aluminum and magnesium plants.

In announcing the hearings, Chairman James E. Murray (Dem., Mont.) says he sees in these plants potentialities for the creation of "60,000 new small business enterprises, providing a strong foundation in support of the President's 60 million job goal." The committee, he says, will direct its inquiry toward "antimonopoly aims." Says the senator: "This is to be no witch hunt, but the co-operative effort of private industry, big and little, with government to develop the facts surrounding the light metals industries and the problems of disposing of the government's huge holdings in them."

"As steel has characterized the great developments of the century up to World War II," says Senator Murray, "so the light metals hold great promise for the vast industrial expansion required in the postwar era of development."

Industrialists scheduled to be heard are: R. S. Reynolds, president, Reynolds Metals Co.; Willard H. Dow, president, Dow Chemical Co.; G. R. Gibbons, senior vice president, Aluminum Co. of America; J. O. Gallagher, president, Columbia Metals Corp.; C. C. Loomis, president, New England Lime Co.; Henry Kaiser, president, Kaiser Co. Inc.; W. S. James, chief engineer, Studebaker Corp.; A. W. Scarrett, vice president, International Harvester Co.; H. H. Howard, vice president, Fruehauf Trailer Co.; J. J. Pelley, president, Association of American Railroads; John E. P. Morgan, chairman, management committee, Aeronautical Chamber of Commerce; J. P. Neiman, president, Aluminum Research Institute, and others.

Tool Co. Asks Armed Forces For Return of Key Employes

A guarantee of 25 per cent increase in production has been offered to military and manpower authorities by the National Tool Co., Cleveland, in exchange for the release of 50 of its "prime essential" skilled workmen from the armed forces.

In addition it offers 50 other less skilled men from its shop forces to replace them. A list of 50 key men which the company wishes to be returned to the plant has been presented to the War and Navy Departments, Selective Service System and the War Production Board for consideration.

Nazi War Production Hard Hit

Advancing Allied forces steadily neutralizing steel and other industrial capacity. Ferroalloy supply nears vanishing point **now that Germany has been cut off from outside sources**

THE ALLIED squeeze-play on Germany day by day is bringing closer inevitable neutralization of the annual 36 million ton steel production capacity, all that remains from a 60 million ton continental capacity once available for the Nazi war effort.

As United States, British, and Canadian troops push on the west wall of Germany and as the Russians drive through the eastern border of the Nazi homeland the effectiveness of Germany's production facilities decreases through loss of territory, aerial bombings, and weakening of German and slave morale. As German realization of the futility of continuing a losing fight increases, there undoubtedly is a widening of opportunity for sabotage of industrial production either by Germans who "want to get it over with" or by captive laborers from other countries.

For some months Germany, cut off from almost all outside sources of ferroalloys, has been dependent on its reserve stocks. Her recent annual supply of manganese has been about 70,000 tons, sufficient for annual production of only about seven million tons of steel, compared with estimated 1943 production of 35 million tons.

Practically all her sources of chrome have been cut off. Tungsten has been increasingly difficult for Germany to obtain.

Remaining annual German output of nickel is estimated at about 1000 tons, equivalent to approximately 10 per cent of her 1943 supplies. Her always-limited supply of molybdenum, which in 1943 was approximately 650 tons, is now not more than 200 tons a year, and that comes from Norway. German domestic output of cobalt has been about 100 tons.

In 1943 Germany produced about 1000 tons of vanadium, almost all of which came from the Lorraine iron ores which, of course, are now unavailable to her.

Believes German Refineries Protected by Arrangement

Scattered arrangement of oil refineries has been suggested by J. D. Andrew Jr., New York engineer of the Babcock & Wilcox Co., as the reason that Germany still had appreciable oil refinery production.

The possibility is that the scattered arrangement of a refinery has made it difficult to destroy the boiler plants which would result in complete loss of production, Mr. Andrew explained in an address to the Cincinnati Section of the American Society of Mechanical Engineers. He called the boiler plant the "heart of production," and the "vital organ of industry's life."

WPB Compiling Data on Shipments Of Steel by Warehouses in 1944

Information will be made available to steel mills to help them in determining what part of their total production was used in filling war contracts and, therefore, is subject to renegotiation by the government

INFORMATION on the tonnages of steel that steel warehouses shipped in 1944 to war procurement agencies is being compiled by the War Production Board to aid the steel mills in determining what part of the mills' total output was going into war use and what part, therefore, is subject to renegotiation.

WPB's Steel Division also is preparing estimates on the amount of steel shipped by the mills in 1944 for further conversion; for example, steel shipped by one mill as tube rounds and converted by another mill into seamless tubing. In addition, the estimate will include the overall industry portion of "B" product (finished product) shipments applicable to the war procurement agencies for 1944.

End Use Information Required

A breakdown of the ultimate use of warehouse steel is required under provisions of Title Seven of the 1943 Revenue bill which covers renegotiation of war contracts. The field of operation of renegotiation is limited, in part, by provision that the statute is not applicable if the aggregate receipts or accruals from war contracts by the contractor or subcontractor do not exceed $500,000 for any fiscal year ending after June 30, 1943; that only war contracts are subject to renegotiation and a contractor's nonwar profits are segregated and not considered in renegotiating; and by the definition of "subcontract" and other terms in the bill.

The term "subcontract" means any purchase order or agreement (other than a contract with a department) to make or furnish or perform any part of the work required for the making or furnishing of a contract item or a component article. A "contract item" is defined to mean any article, work, service, building, structure, improvement, or facility contracted for by a department. A "component article" is defined to mean any article which is to be incorporated in or as a part of a contract item. The term "article" is defined to mean any material, part, assembly, machinery, equipment, or other personal property.

As explained by the House Ways and Means Committee at the time the bill was written, the following example illustrates the scope of items coming within the definition of a component article: Assume that the War Department contracts with company A for the purchase of a tank. Company A contracts with company B (possibly a warehouse) to furnish the plates and, in turn, company B contracts with company C to furnish the steel. Subcontracts for all of these articles are subject to renegotiation because they are incorporated in or as a part of the contract item, which in this case is the tank. However, if company B contracts with company D for shearing equipment to fabricate the plates, B's contract with D is not renegotiable, for the reason that it is not a contract for an article to be incorporated in or as a part of the contract item. For the same reason, if company D contracts with company E for some steel for the shearing equipment, D's contract with E is not renegotiable. Also, if company B, who contracts to furnish steel plates to company A, contracts with company F for business machines, that contract is not subject to renegotiation. In other words, only an end product or products that enter into an end product are subject to renegotiation. The bill also exempts subcontracts as are directly or indirectly under an exempt contract or subcontract.

The steel mills, of course, can account for their direct shipments to the war agencies but it is only through the records of WPB's Steel Division that the indirect shipments can be traced. This information was furnished to the Price Adjustment boards of the War and Navy departments in 1943, and subsequently to the steel companies.

It is expected that a similar notification to the steel industry will be made by the Steel Division in the early part of March.

Surplus War Property Sales Bring 59 Per Cent of Cost

Four government disposal agencies sold $27,701,000 of surplus war property in December, representing 59 per cent of cost or appraised value, Surplus Property Board has announced. Disposals by Reconstruction Finance Corp. amounted to $14,748,000 and brought 47 per cent of cost; Procurement Division of the Treasury Department, $12,105,000 and 75.4 per cent of appraised value; United States Maritime Commission, $754,000 and 42 per cent of cost; and War Food Administration, $94,000 and 27.7 per cent of cost.

Supply of Ferrochrome Drops Below Consumption

Chrome stainless steel situation is uncertain, representatives of the War Production Board told table flatware manufacturers recently. While increased quantities are being made available by the Soviet Union, the total supply is less than current consumption, with the result that 1945 production and use of ferrochrome by the flatware industry must be held to the 1944 level.

Carbon steel sheets and strip will not be readily available to the industry in needed sizes and gages since mill schedules for these types are completely filled. Due to the manpower shortage, no copper strip, copper-base alloy rod, tube and other brass mill products can be permitted for flatware.

OPA Modifies Pricing Provisions Governing Resales of Certain Iron and Steel Products

MODIFICATION of pricing provisions governing resales of iron and steel products from supplementary warehouse facilities was announced last week by the Office of Price Administration. This action was taken to prevent the penalizing of steel warehouses and jobbers who, because of a shortage of space or transportation, cannot store all of their stocks on their own premises.

Resellers of iron and steel products are authorized, effective as of Feb. 15, to add warehouse and jobber mark-ups to mill prices in resales of pipe and tubular products from supplementary storage or warehousing facilities.

Previously these mark-ups could be charged only if the warehoused pipe or tubular products actually had been unloaded, stored or delivered from premises regularly maintained by an owner of the material for the purpose of performing warehousing operations upon the material.

The warehouse mark-up may be charged by the reseller on any pipe or tubular products unloaded, stored and delivered from any premises regularly maintained for such operations by any person except the producer or a holder of excess stock.

Warehouses and jobbers may apply to OPA for permission to charge warehouse prices on resales of iron and steel products other than pipe and tubular products delivered from similarly defined supplementary facilities when: The seller expects to deliver from stock stored temporarily at premises maintained by persons other than a producer or holder of excess stock; emergency conditions do not permit him to store the material at

premises he regularly operates; and when a substantial portion of his deliveries are not expected to be made from the supplemental space.

Applications for permission to charge warehouse prices on resales of iron and steel products (other than pipe or tubular products) stored in supplementary storage or warehousing facilities are to be made to the Iron and Steel Branch, OPA, Washington.

Application may be made to OPA also for permission to charge warehouse prices for iron and steel products allocated to a reseller by the War Production Board, and held for reshipment subject to the direction of that agency, even though the material is not stored on the warehouse's own premises.

Warehouse ceiling prices for iron and steel products generally are the mill prices plus mark-ups of 25 to 66 2/3 per cent. For direct mill shipments of special-name steels, special permission to charge warehouse prices will be granted by OPA only where a higher than mill price is found fair and equitable, and in no case will a warehouseman's price thus authorized be higher than he charged on April 16, 1941, OPA said.

Maritime Commission Forms Surplus Materials Division

United States Maritime Commission has created a Contract and Surplus Materials Division charged with the settlement of claims under terminated war contracts for supplies, shipbuilding and facilities, and with redistribution of unrequired materials as well as the disposal of surplus property, except vessels. Burton L. Hunter has been appointed director of the division and is authorized to make or approve binding settlements of war contractors' termination claims not in excess of $10,000; to grant partial payments not in excess of $10,000 on a single claim, or $50,000 on all unsettled claims of any single prime contractor; and to recommend settlements or partial payments in greater amounts to the Settlement Review Board.

Merchant Shipyards Deliver Larger Tonnage in January

Merchant shipyards delivered 120 vessels, aggregating 1,229,296 deadweight tons, and one large derrick barge during January, 1945, United States Maritime Commission announced last week. This represents an increase in tonnage of 1.6 per cent over the total in January, 1944, and 22 per cent above that in January, 1943. West Coast shipyards built 51 vessels of 521,815 deadweight tons, or 42.5 per cent of the total; East Coast yards, 37 vessels of 366,249 tons, or 29.8 per cent; Gulf Coast yards, 29 vessels of 326,202 tons, or 26.5 per cent; and Great Lakes yards, 3 vessels of 15,030 tons, or 1.2 per cent of the tonnage.

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives issued by War Production Board and Office of Price Administration

INSTRUCTIONS

FARM MACHINERY: Farm machinery manufacturers, whose plants are not running at full capacity, who have necessary labor available, may apply to the War Production Board for authorization to make more than their approved quotas of these items. Applications should be filed by letter in local WPB field offices, with a separate letter for each item. Uniform procedure for making such applications is established in direction 6 to order L-257.

L ORDERS

STERILIZER EQUIPMENT: Restrictions on the sale and delivery of sterilizer equipment have been removed. Types of sterilizer equipment that may be manufactured are still limited, however, to those listed in schedule A of order L-266 and manufacturers are still required to file monthly production and shipping schedules on form WPB-2232. Restrictions on the use of copper and copper-base alloys remain unchanged. (L-266)

INDEX OF ORDER REVISIONS

Subject	Designations
Antimony	M-112
Chains, Tire	M-293
Sterilizer Equipment	L-266
Price Regulations	
Chromium Chemicals	No. 575

M ORDERS

ANTIMONY: WPB's Tin-Lead-Zinc Division has assumed full control of the deliveries and use of antimony, which has been on the "free" list since Dec. 4, 1942. No person may receive in any one month more than 2240 pounds of antimony either in the form of ore, antimony metal, liquated antimony, any alloy containing 50 per cent or more of antimony, antimony oxide or antimony sulphide, except by WPB allocation. Inventories of antimony ore are limited to 45 days' supply while all other forms of antimony are limited to 30 days. (M-112)

TIRE CHAINS: Military truck tire chains and parts have been added as undesignated products in an amendment to table 12 of general scheduling order M-293. At the same time, direction 1 to table 12 was revoked, relieving large users of antifriction bearings of the requirement of filing their bearing requirements on form WPB-3333. (M-293)

PRICE REGULATIONS

CHROMIUM CHEMICALS: Increases ranging from 25 to 75 cents a hundred pounds in maximum prices for primary chromium chemicals have been announced by OPA. These increases represent the first change in prices for the commodities since July, 1941, and were necessary to restore industry earnings to prewar levels. (No. 575)

FEA Reports on Lend-Lease Shipments to Soviet Union

From the beginning of the program up to Dec. 1, 1944, the United States had supplied Russia under lend-lease more than 331,000 motor vehicles, including 45,000 jeeps, and 29,000 motorcycles, Foreign Economic Administration reported recently. Through November, 1944, we had supplied under the lend-lease program 1045 railroad locomotives, 7164 flat cars, 1000 dump cars, 100 tank cars and 2,120,000 tons of steel. Of the total steel tonnage, 478,000 tons consisted of railroad rails and 110,000 tons of wheels and axles. The United States has also shipped under lend-lease 16,600 tons of ferroalloys and 733,000 tons of nonferrous metals, including 253,000 tons of aluminum, 314,000 tons of brass and 65,000 tons of other copper products.

Under lend-lease the United States also has aided the Soviet Union in rebuilding and re-equipping her war industries. In this connection, we have sent 60 power trains to help replace sources of power, such as the ruined Dneprostroy dam, for these industries.

Finished munitions sent to Russia up to Nov. 30, 1944, include: 12,200 airplanes, 135,000 machine guns, 294,000 tons of explosives, 6000 tanks, 1800 self-propelled guns, 1200 half tracks, 13,000 pistols, 3300 armored scout cars, 8200 guns of varied sizes, 5500 artillery prime movers, and 1700 ordnance vehicles.

Appointments-Resignations

C. Girard Davidson, general counsel of the Bonneville Power Administration, and Stewart W. Richards, counsel for the WPB Chemicals Division, have been named assistant general counsels, WPB.

* * *

Warren Spencer has been appointed director of the Building Materials Division, War Production Board, succeeding John Haynes, who was named director of the Construction Bureau last December.

* * *

Russell L. Kingston has been appointed, effective March 1, to succeed Grace G. Glascott, resigned, as Ohio and Michigan regional director of the Wage and Hour and Public Contracts divisions, Department of Labor.

* * *

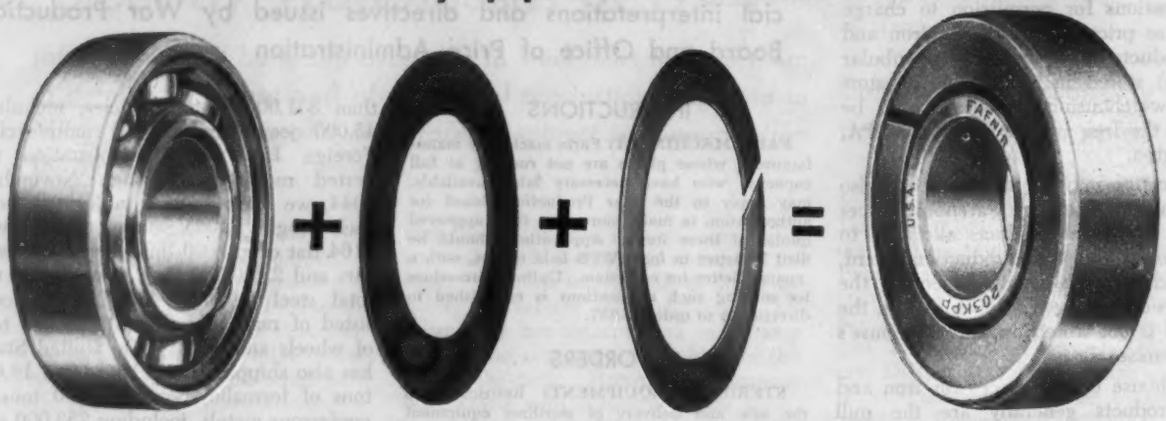
I. Robert Feinberg, assistant general counsel, National War Labor Board, has been promoted to chairmanship of the board's Appeals Committee. He will continue to serve as chairman of the joint WLB-Labor Department committee which makes recommendations on all cases arising under executive order 9240.

* * *

Louis R. Inwood has been appointed special aircraft assistant to the board of directors of Reconstruction Finance Corp. in connection with its surplus aircraft disposal activities.

FAFNIR PLYA-SEAL BALL BEARINGS

Performance Proved in Military Equipment • Now Available for General Use



Fafnir Standard Ball Bearing — Flexible Sealing Washer — Split Retaining Ring — FAFNIR PLYA-SEAL BEARING

POSITIVELY SEALED —SEALS EASILY REMOVED

THE result of five years of development and testing, PLYA-SEAL bearings have proved the most effective, self-protected bearings yet designed. Approved for aircraft by the Army Air Forces and the Bureau of Aeronautics U. S. Navy, Fafnir PLYA-SEALS have been in use successfully for over two and one-half years in aircraft control bearings and operating equipment. Several thousand bearings incorporating the double PLYA-SEAL have completely eliminated former difficulties with metal shielded bearings in textile machines.

Whether you are designing a new product or planning to resume production on an old one, you will find it very much worthwhile to investigate and test Fafnir PLYA-SEAL Bearings. Write for complete descriptive folder. The Fafnir Bearing Company, New Britain, Conn.

WHAT IS PLYA-SEAL?

A diaphragm-type, contact seal comprised of two members – a flat, flexible sealing washer of synthetic rubber impregnated fabric and a split retaining ring of stainless steel.

Firmly held in the outer ring, the sealing washer does not rotate with the inner ring but is in contact with a ground groove to form a very effective seal with a minimum of friction.

WHAT ARE PLYA-SEAL'S ADVANTAGES?

1. Assures maximum retention of lubricant, maximum exclusion of dirt and liquids.
2. Causes no distortion of the outer ring or race, nor does it affect the concentricity of either the rings or races.
3. Forms a positive seal with the outer ring while maintaining perfect contact with the inner ring.
4. Non-capillary and impervious to liquids, grease, oil, gasoline, water and a wide variety of solvents. Not affected by heat or cold. Sealing washer does not deteriorate with age.
5. Easily removed and replaced to allow inspection, washing and re-greasing.

PLYA-SEAL takes its place among these other FAFNIR "FIRSTS" . . . Wide Inner Ring Ball Bearing with Self-Locking Collar; Seal and Shield Type Bearings; Compact Super-Precision Spindle Bearings; Compound Retainers, Aircraft Ball Bearings, Rubber Pillow Blocks . . . and more.

FAFNIR BALL BEARINGS

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Large new war contracts placed in Detroit area "to maintain peak employment and production;" $600 million placed in January and another $136 million in early February. Postwar plans of Fisher brothers still unrevealed

DETROIT

IN LINE with its "accentuate the positive and eliminate the negative" policy, the tom-tom beaters for the WPB, or public relations experts as they are called in more refined circles, are currently pulling out all the stops with respect to the mounting volume of war contracts being placed in this area. Similar technique has been instituted by the Navy official voices, as was noted in these pages recently in respect to a vast sheaf of rocket contracts placed with 1500 plants in this region.

The changing policy is reminiscent of the early days of the war program when, several times a week, government agencies would release long lists of war contracts placed with industries throughout the country. After a year or two, censorship clamped down, and the lists of new contracts were withheld from publication, presumably because the information would inform the enemy on which plants to center their attention.

The situation, however, has changed again and it becomes necessary to lay stress on the fact war contracts are being extended and enlarged. So, the word is passed along that Detroit plants received $600 million in new contracts during January, and another $136 million in the past ten days. Since the first of the year, contracts placed amount to about 25 per cent of the total for all of 1944, and procurement agencies make no bones about stating positively the contracts are being placed "to maintain peak employment and production"—not, you will notice, because of specific requirements of the armed forces.

To Use Single Fin and Rudder

About half the January total, or roughly $300 million, was for B-24-N bombers to be built at Willow Run. The "N" model, latest in the Liberator series, apparently will sport the single fin and rudder assembly, instead of the conventional double type hitherto used.

Among the largest of the most recent contracts is one for about $30 million of B-29 Superfortress parts, 30 per cent of which will be handled by Fisher Body and 20 per cent by Hudson. Ammunition and components covering another $10 million were awarded to Bowen Products, Carboloy and MacLeer. Facilities expansion amounting to better than $5 million was approved for the Detroit Transmission Division of General Motors, in connection with production of transmissions for heavy tanks, presumably those now in production at the Fisher and Chrysler arsenals.

Detroit Diesel Division of GM gets another $6 million worth of spare parts for medium tank engines. Nash-Kelvinator books $4.5 million worth of propeller equipment, including governors, feathering assemblies and spare parts, with [illegible] per cent of the contract to be subcontracted. Ferro Stamping has received additional commitment for over $1 million to cover ammunition boxes for 40-millimeter Navy shells.

These appropriations for many millions make interesting reading, and probably are comforting to working people in the plants involved. But alongside them must be stacked the tremendous capacity of the automotive industry for handling war production—now about $10 billion a year. This is not all in the Detroit area, but a large share of it is. Obviously as old contracts run out, plants must either be given continuing contracts, new contracts, or be released for civilian production. There is a suspicion the military is now being confounded by this situation, with the result it must extend orders whether the products are needed or not, simply to keep the production machine going. This is a highly dangerous policy, but there appears no alternative.

Of course, the changing demands of the various war theaters do call for new types of equipment and modifications to old. Ford, for example, is now in process of assimilating $110 million worth of contracts for new aircraft engines and parts. About half this total is for the Pratt & Whitney R-2800-C engine, similar to that being built by Chevrolet at Tonawanda, N. Y. Production of the new model engine, said to be for installation in the new Consolidated B-32 Dominator bomber, will begin as soon as possible after completion of an additional order for $35 million worth of R-2800-B type engines, scheduled for manufacture and shipment this summer. About 50,000 of these engines already have been shipped by Ford. In addition to these two orders, contracts for spare parts received recently make up the balance of $35 million.

Four types of Pratt & Whitney aircraft engines are in production at Buick plants for cargo planes and bombers, three of them 1830-cubic inch displacement and one 2000-cubic inch. Heretofore, practically all Buick engine production was for the B-24 Liberator bomber, and the later models are for Douglas cargo transports. Extensive retooling of plants, both in Flint and Chicago, was required. Beginning last summer, equipment changes were co-ordinated with continuing production.

Fisher Body's Ternstedt Division has undertaken a new contract for supplying three integral parts for an air position indicator system for aircraft. The units include a computer, a pump and a drive mechanism, manufacture of which was originally handled by the Eclipse-Pioneer Division of Bendix Aviation, but which will eventually be taken over entirely by Fisher.

Nothing but silence has emanated from offices of the Fisher brothers, following their amicable divorce from General Motors. Fragmentary reports have popped up from various centers that they were preparing to manufacture an automobile

STREAMLINED MAINTENANCE: Foremen handle repair and maintenance calls, write out repair orders, and direct maintenance workers from one job to another through a 16-line switchboard located in the central maintenance shop which serves six plants of the Chevrolet Gear & Axle Division in Detroit

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on their own after the war, and supposedly had retained designers to work out styling details, but no confirmation of such speculation has been forthcoming. One local observer has pointed out that the appearance of a new Fisher car conceivably could stall efforts of the OPA to control prices of postwar automobiles, since the price agency had indicated it would attempt to relate new prices to those prevailing in 1942. Obviously there would be no basis on which to establish the price level of a Fisher model, so it would appear unfair to saddle the rest of the industry with such regulation. This can be classed as mere idle chatter, but it helps pass the long winter evenings.

By dribs and drabs, the postwar plans of Joseph Washington Frazer and his budding Graham-Paige Motors are being released to an avid press. Latest word is that marketing plans for the company's postwar car have reached the final state, and the awarding of franchises to 1200 distributors throughout the country is scheduled for the next 90 days. Mr. Frazer has related to a group of New York security analysts some of his distribution and financing plans, in which he is pursuing a course diametrically opposite to that of some other motor interests who are moving toward the elimination of distributors. Mr. Frazer's dealers —3500 to 4000 of them—will function under distributors in territory allotted to them. He will build his new outlets on the same policies he used to develop the Chrysler sales organization 20 years ago.

During the first year of Graham production, the fond hope is to see 350 to 400 cars a day rolling from production lines for an annual total of around 100,000. The effort will be made to effect a rural tie-in between automobiles and proposed Graham farm implements, including the Rototiller, a new cultivator and a tractor. Summing it up, Graham figures on about $80 million worth of automobile business and another $50 million of farm implement business per year. About $10 million worth of new capital probably will be sought to supplement the $3.5 million working capital the company now has.

Word from Dublin, headquarters of the Industrial and Commercial Registration Office, says the office has denied Willys-Overland Motors Inc., Toledo, O., exclusive use of the name "jeep" ruling that the word has now "fallen into the public domain." This will doubtless prove a sudden shock to Ward Canaday, chairman, and C. E. Sorenson, president of the Toledo company, who have been promoting the jeep far and wide as the glamor-boy of the war and a real ace-in-the-hole for postwar profits. Their advertising and publicity has been keyed to this theme, and even though the name has been adjudged public property, the company can be expected to make a sharp fight to keep it closely associated with Willys.

Additional orders for approximately 30,000 combat and transport vehicles have been received by the Ford Motor Co. from the armed forces, covering production of universal carriers, light armored cars and jeeps. Production under former schedules would have ended in the spring and summer of 1945.

When Ford completes the jeep contract nearly 300,000 units will have been manufactured. At year-end, Willys-Overland announced it had built 300,000 jeeps, so the total now shipped runs well over half a million.

The new universal carrier order will bring the Ford Somerville, Mass., branch's total production to more than 17,000 units. So far carriers have been assembled at the rate of 400 a month. The Somerville branch is the only plant in the U. S. assembling universal carriers which are being sent the British under lend-lease.

The armored vehicle order was broken down into two parts, light armored cars and utility command cars, modifications of the armored car.

The armored car order now amounts to more than 13,000 units and will carry to December, 1945. Under the old schedule approximately 200 units a month were to be assembled to July, 1945, and the utility command cars were to be produced at about 70 units a month to July, 1945.

"TAIL-FIRST" PLANE: Flight view of the Curtiss Ascender XP-55, a fast and highly maneuverable pusher type fighter, is shown above. The craft is powered by an Allison 1275-horsepower engine, which drives a Curtiss electric 3-blade propeller. Forward control surfaces and rudders are shown near the wing tips

Discovery Permits Diesel Engines To Use Gas or Oil

A discovery in the diesel engine field, which will enable the engine operator to use either gas or oil as fuel without any electrical sparking device, and which will cut fuel consumption of gas engines by 20 to 25 per cent, has been announced by the Cooper-Bessemer Corp., Mt. Vernon, O., diesel manufacturers.

The discovery results from experimentation which began in 1928, according to Ralph L. Boyer, chief engineer for the corporation. Successful operation of a natural gas engine on the diesel principle enables the unit to operate on a wide variety of fuels including fuel oil, natural gas, manufactured and coke oven gases, sewage gas, and refinery by-products.

Conversion from liquid to gas fuel is as simple as the closing of one valve and the opening of another with the engine operating continuously at full load, Mr. Boyer said. Although conversion from one fuel to another has been possible in the past, it has always been necessary to shut down and exchange major or minor parts of the engine.

The new discovery in diesel operation will mean elimination of one of the greatest fire hazards in the gasoline refining industry because there will be no necessity for using any sparking device.

Markets for Stampings In Postwar Era Discussed

Outlook for postwar markets for stampings was discussed at recent district meetings of the Pressed Metal Institute in Toledo, O., Worcester, Mass., and Detroit.

E. M. Tasker, vice president, Toledo Stamping & Mfg. Co., Toledo, was re-elected chairman of the Toledo district; Carter C. Higgins, vice president, Worcester Pressed Steel Co., Worcester, was elected district chairman for the New England group; and G. H. Roberts, president, Detroit Stamping Co., Detroit, was re-elected Detroit district chairman.

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BECAUSE of these large and varied stocks, Harper is known as "Headquarters for Everlasting Fastenings" . . . "Your Logical Source" of non-ferrous and stainless bolt and nut products.

At Harpers the buyer finds three unique and distinct advantages. First, large stocks of all types of fastenings such as bolts, nuts, screws, washers, rivets and specials; second, fastenings in all the commercial non-ferrous and stainless alloys except aluminum, e.g. brass, copper, naval bronze, silicon bronze, Monel and stainless steel; third, large stocks of metals in bars, rods, wire, strip and other basic forms from which special fastenings can be quickly made according to specifications.

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MEN of INDUSTRY

NEIL K. BARR

ALBERT W. NELSON

Neil K. Barr has been appointed chief engineer of the Copper Wire Engineering Association, St. Louis. For many years Mr. Barr was associated with the Public Service Co. of Northern Illinois.

—o—

A. S. Rairden has been appointed sales manager, Wire Rope Division, Wickwire Spencer Steel Co., New York.

—o—

Charles S. Mattoon has been appointed industrial relations director of the Weatherhead Co., Cleveland. Previously Mr. Mattoon directed industrial relations for the Airplane Division of Curtiss-Wright Corp., Buffalo.

—o—

Elmer C. Hill, who has been associated with the War Production Board for the past several years, has been appointed general manager of the Chicago branch of Holcomb & Hoke Mfg. Co., Indianapolis.

—o—

S. B. Heppenstall, since 1917 vice president in charge of engineering, Heppenstall Co., Pittsburgh, has been elected chairman of the board. Mr. Heppenstall, the second son of Sam Heppenstall, company founder, joined the organization as a draftsman in 1897.

—o—

Walter J. Riley has been appointed vice president, Industrial Metal Fabricators Inc., Chicago.

—o—

Frederick W. Hainer, formerly chief engineer, Cleaver-Brooks Co., Milwaukee, has been appointed vice president. He will be in charge of numerous management, sales and production activities.

—o—

G. J. Metzger, previously assistant general sales manager, Martin-Perry Body Co., Indianapolis, has been made manager of the Indianapolis zone for Chevrolet Division of General Motors Corp., Detroit.

—o—

Creation of four positions in the engineering department of Allison Division of General Motors Corp., Detroit, to cope with increased production, has been announced. The new positions and men who fill them are: Executive engineer, **Roy E. Lynch;** chief development engineer, **Charles J. McDowall;** chief turbine engineer, **J. C. Fetters,** and chief engine engineer, **Dimitrius Gerdan.**

—o—

Albert W. Nelson has been appointed assistant manager of sales for the New England district, American Steel & Wire Co., Cleveland. He has been associated with the company since 1939.

—o—

Edward C. Fales has been elected vice president, American Welding & Mfg. Co., Warren, O.

—o—

John J. Yezbak has been appointed manager of public relations as well as the news bureau of Timken Roller Bearing Co., Canton, O.

—o—

J. K. Deasy has been made assistant to the general traffic manager, Weirton Steel Co., Weirton, W. Va.

—o—

William O. Miller has been appointed assistant to **Louis Francisco,** manager of the New York office of Formica Insulation Co., Cincinnati, and **Frank C. Konersman** has been assigned to the Detroit office to assist **Frank Manley,** office manager there.

—o—

A. C. Mohr has been appointed Chicago district manager for Union Chain & Mfg. Co., Sandusky, O. His offices will be at Room 1236, 53 West Jackson boulevard.

—o—

Harry Hodge, previously assistant controller, Tubular Alloy Steel Corp., Gary, Ind., has been appointed controller of the Sealed Power Corp., Muskegon, Mich.

—o—

Harry F. Davis, formerly general manager of sales, Monarch Aluminum Mfg. Co., Cleveland, has joined Accurate Die Casting Co., Cleveland, as manager of sales and field engineer.

—o—

Zolly Carlton Van Schwartz has been made chief of machinery development in the Technical Division, Peck, Stow & Wilcox Co., Southington, Conn. Previously he had been engineering coordinator, Firestone Aircraft Co., and mechanical research and development engineer, Firestone Ordnance, Akron, O.

—o—

Willard Walker, vice president, Mack-International Motor Truck Corp., has been appointed to the managerial post of the Greater New York Division, with headquarters at 625 West 42nd street.

—o—

Frederick Kalmbach Jr. has been elected president, General Machine Co. Inc., Emmaus, Pa., to succeed his father, **Fred Kalmbach,** who becomes chairman of the board. **M. Lindroth,** production manager and purchasing agent, has been elected a vice president.

—o—

Wendell G. Lewellen, assistant general sales manager, Chevrolet Motor Division, General Motors Corp., Detroit, is now in charge of parts and accessory merchandising, warehousing and distribution. He will be assisted by **I. W. Thompson** as national manager of parts and accessory merchandising, and **John P. Hopkins** as national manager of warehousing and distribution.

—o—

Dr. D. Gardner Foulke, recently chief chemist, Garfield Division, Houdaille-Hershey Corp., Detroit, has joined the staff of Foster D. Snell Inc., Brooklyn, N. Y., as director of the analytical department.

—o—

James G. Scarff, formerly vice president and director of Harriman Ripley & Co., New York, presently executive in the Procurement Division, Air Technical Service Command, Wright Field, O., has been promoted to the grade of full colonel. Col. Scarff is responsible for the Procurement Division's purchasing activities.

—o—

Howard A. Byrns has been appointed chairman of the blast furnace, open hearth and coke committees of American Steel & Wire Co., Cleveland, and **Harold Cope** has been made general superintendent of Central Furnaces and Coke Works in Cleveland, succeeding Mr. Byrns.

—o—

Fred W. Sherman, president, Adirondack Foundries & Steel Inc., Watervliet, N. Y., has been elected to the board of directors of the Albany Chamber of Commerce.

—o—

William Rodgers, formerly chief metallurgist of the Cleveland district of Republic Steel Corp., Cleveland, has been appointed assistant superintendent of the 98-inch strip mill and **T. M. Chapman** has been made chief metallurgist to succeed him.

—o—

Canadian Department of Munitions and Supply, Ottawa, has announced appointment of **G. James** as assistant comptroller and **B. C. McMonagle,** assistant

to the comptroller. **A. G. Burton** has been named chief, Production and Stores Accounting Division, Comptroller's Branch, succeeding Mr. James, and **W. McCready** becomes assistant chief of the division.

—o—

L. F. Campbell, formerly with United Aircraft Corp., New York, has joined Foote Bros. Gear & Machine Corp., Chicago, as vice president. **E. A. Johnson** and **R. B. Moir** have become assistant vice presidents, and **I. C. McVicar** and **L. J. Malina** have been named assistant secretary and assistant treasurer, respectively.

—o—

W. H. Webb has been named assistant sales manager, Alkali Division, Detrex Corp., Detroit. Previously he was manager of the company's Indiana Division.

—o—

Murray B. Wilson has been appointed district sales manager in Dayton, O., for American Rolling Mill Co., Middletown, O., succeeding **Edson D. Dronberger,** who is moving from Dayton, and **W. B. Quail** succeeds Mr. Wilson as New York district manager of sheet and strip sales. **Mitchell G. Duncan** has been transferred from St. Louis to the Detroit sales office. **Fred Mayhew** replaces Mr. Duncan in St. Louis, and **Robert L. Wells Jr.** transfers from the Minneapolis sales office to Dallas, Tex.

—o—

Jerome Benjamin, steel pricing official in Los Angeles for the OPA, has resigned to take an executive position with Industrial Materials Co., newly organized steel and metal warehouse opening at 4950 Long Beach avenue, Los Angeles.

—o—

Thomas J. Bannan has been elected president of the Western Gear Works, Seattle, succeeding his father, the late P. L. Bannan Sr. Other members of the family were elected to the other principal offices as follows: **Berchman A. Bannan,** vice president; **Phillip A. Bannan Jr.,** treasurer, and **Charles F. Bannan,** secretary. President Bannan is also president of Webster-Brinkley Co. and Hallidie Machine Co., Seattle.

—o—

U. E. Sandelin has been appointed manager of Allis-Chalmers Mfg. Co.'s Seattle district office, succeeding **A. J. Schmitz,** Pacific regional manager.

—o—

Raymond D. Dwyer has been appointed superintendent of the steel production department, Gary Works, Carnegie-Illinois Steel Corp., Chicago, and **Jacob C. Wilkins** has been made superintendent of central mills.

—o—

James D. Jones has joined H. A. Brassert & Co., consulting engineers, New York. For the past ten years Mr. Jones has been chief engineer of Youngstown Sheet & Tube Co., Youngstown, O.

—o—

Carlton J. Daiss, assistant vice president, Wells Fargo Bank & Union Trust Co., San Francisco, has resigned to become associated with **Charles E. Moore,** president of Joshua Hendy Iron Works, Sunnyvale, Calif., and general partner of Moore Machinery Co.

—o—

J. Raymond Smith has been appointed to the newly-created position of assistant to the general sales manager, Rustless Iron & Steel Corp., Baltimore. Previously Mr. Smith was manager of stainless steel sheet sales for Eastern Stainless Steel Corp., also of Baltimore.

—o—

Arthur H. Hjortsberg has been appointed assistant operating head of the Gary steel works of Carnegie-Illinois Steel Corp., Chicago. He succeeds **Dr. Erle G. Hill** who resigned recently to take a position with another company. **Edwin H. Gott** has been named assistant

T. EMBURY JONES

E. W. FORKNER

Mr. Jones and Mr. Forkner have organized Precision Welder & Machine Co., Cincinnati, as announced in STEEL, Feb. 12, p. 89. Mr. Jones is slated to be elected president and treasurer, and Mr. Forkner is to be vice president in charge of operations.

R. L. HEATH

to general superintendent, in charge of service departments, and **John J. Golden** has become division superintendent of the combined open hearths and central mills.

—o—

R. L. Heath, formerly chief metallurgist of the Allison Division, General Motors Corp., at Indianapolis, has joined Climax Molybdenum Co., New York, as metallurgical engineer.

—o—

Arthur R. C. Markl has been named chief research engineer, Tube-Turns Inc., Louisville, Ky. Before joining Tube-Turns Mr. Markl was in charge of development of equipment for oil refineries, M. W. Kellogg Co., New York.

—o—

Changes in the sales department of National Tube Co., Pittsburgh, have been announced as follows: **J. B. Graham,** assistant to the vice president, sales; **W. J. McKee,** central area sales manager, and **W. T. Miller,** assistant to general manager of sales.

—o—

Lester F. Clawson has joined the staff of Battelle Memorial Institute, Columbus, O., where he will assist in research on product design and production methods.

—o—

Donald O. Notman has been named director of the newly-formed technical division of the Electrochemicals Department, E. I. du Pont de Nemours & Co. Inc., Wilmington, Del. **Dr. C. W. Tucker** will be chemical director of the new division and **Dr. Sterling Temple** will be a special assistant to Dr. Tucker.

—o—

H. F. Howard has been appointed vice president in charge of manufacturing, Fruehauf Trailer Co., Detroit, and **A. K. Tice** has been named vice president in charge of sales.

—o—

Maj. Thomas H. Bradley has assumed command of the Kingsbury Ordnance plant near LaPorte, Ind., succeeding **Maj.**

MEN of INDUSTRY

F. H. Phillips, who has been transferred to the Cornhusker Ordnance plant, Grand Island, Nebr., as commanding officer. Major Bradley returns to this country from the China-Burma-India war theater.

—o—

Ralph J. Cordiner, who has been assistant to the president, General Electric Co., Schenectady, N. Y., since his resignation as vice chairman of the War Production Board 18 months ago, has been elected vice president and assistant to the president of GE.

—o—

Philip D. Reed, until recently chief of the American Mission for Economic Affairs in London, has been re-elected a director and chairman of the board, General Electric Co., Schenectady, N. Y., from which position he resigned in January, 1943. He also has been elected board chairman of International General Electric.

—o—

W. B. Holton Jr., president, Walworth Co., New York, has been elected president of the Valve Manufacturers Association.

—o—

Charles A. Bailey, chief lubrication engineer, Gary works, Carnegie-Illinois Steel Corp., Gary, Ind., has been elected chairman, and **E. J. Ehret,** district representative, Farval Corp., 327 South La Salle street, Chicago, secretary-treasurer of the Chicago section of the recently organized American Society of Lubrication Engineers.

—o—

O. G. Mandt, previously vice president, Jaeger Machine Co., Columbus, O., has been named president, succeeding **Gebhard Jaeger,** who has been elected board chairman.

—o—

James B. Austin, assistant director of the research laboratory of United States Steel Corp. at Kearny, N. J., has been selected to deliver the 1946 Edward de Mille Campbell Memorial Lecture of the American Society for Metals. **Maxwell Gensamer,** professor of metallurgical engineering at Carnegie Institute of Technology, Pittsburgh, is the Campbell Lecturer for 1945.

—o—

John R. Ford and **Walter Maynard Joyner** have joined International Rustproof Corp., Cleveland, to serve in the engineering department.

—o—

L. G. Burwinkel has been appointed assistant to vice president **R. A. Neal,** Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Other Westinghouse appointments are: **Ernest P. Schroeder** and **John T. Mathews,** manager and assistant manager, respectively, of the foreign engineering department; **S. C. Hoey,** assistant director of the headquarters manufacturing engineering department; **J. Howard Wenner,** street lighting specialist for the Middle Atlantic district, and **Edward S. Walker,** member of the headquarters accounting staff.

—o—

N. K. Anderson has been elected president of Alloy Steel & Metals Co., Los Angeles.

—o—

Talon Inc., Meadville, Pa., has combined its works engineering department with the Experimental Engineering Division to form the Experimental and Works Engineering Division, with **Noel J. Poux** as manager. Reporting to Mr. Poux are **Horace Keech,** chief production engineer, and **John Gamble,** chief experimental engineer.

—o—

G. B. Berlien, formerly chief metallurgist, Lindberg Steel Treating Co., Chicago, has joined Industrial Steel Treating Co., Oakland, Calif.

—o—

Ralph J. Teeple has been named general district sales manager, New York district, American Chain & Cable Co. Inc., Bridgeport, Conn. For the past five years he has been New York district sales manager for the company's Page Steel & Wire Division.

OBITUARIES . . .

Emanuel R. Aufiero, 63, research engineer for the E. A. Laboratories Inc., Brooklyn, N. Y., died Feb. 5. Mr. Aufiero was the inventor of a number of automobile accessories, including one of the first types of electric horns.

—o—

Cyrus S. Oldroyd, 72, president of Oldroyd Inc., died recently in New York. Mr. Oldroyd was an inventor of mining machinery.

—o—

Arthur G. Pierce, 74, who for 30 years was a district representative of the Cutler-Hammer Co., Milwaukee, died Feb. 13 in St. Johnsbury, Vt. Mr. Pierce had retired 15 years ago.

—o—

Stephan C. Kreyns, 44, a research metallurgist at the American Smelting & Refining Co., Perth Amboy, N. J., for the past 20 years, died Feb. 7 in that city.

—o—

E. Baird Smith, 38, director of public relations, American Standards Association, New York, died Feb. 8 in Chappaqua, N. Y. Formerly Mr. Smith was assistant to the director of the Conservation Division, War Production Board.

—o—

Michael V. Bonomo, 51, treasurer, Schiavone-Bonomo Corp., Jersey City, N. J., died Feb. 6 in Glen Ridge, N. J., after a prolonged illness. A recognized leader of the scrap industry and one of the founders of the Institute of Scrap Iron and Steel, he served as national president of the Institute during 1937 and 1938.

—o—

Charles F. Norton, 60, former sales manager, Louis Allis Co., Milwaukee, died Feb. 11 at his farm near Alhambra, N. Y. After graduating as an electrical engineer from Purdue university Mr. Norton helped organize Howell Electric Motor Co., Howell, Mich. He was vice president and general manager of that company until he joined Louis Allis Co. in 1933. Ill health forced him to retire ten years later.

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Gordon H. Hamilton, 55, vice president, Glidden Co., Cleveland, died suddenly while on a business trip to Cleveland. He was in charge of the company's Chicago plants.

—o—

Walter E. Carolin, secretary and treasurer, Enterprise Foundry Co., died in Detroit Feb. 4.

—o—

Eugene M. Scoville, 82, inventor and mechanical engineer who traveled to China, Australia, India, and lived for eight years in Honolulu, Hawaii, as a representative for Allis-Chalmers Mfg. Co., Milwaukee, died Feb. 6 in that city. Mr. Scoville had retired in 1930.

—o—

Dr. John D. Ball, 62, professor of physics and business administration at Mount Mary college, Milwaukee, recipient in 1916 of the Longstreth Medal of the Franklin Institute for his work in electro-magnetism, and for three years an assistant to Dr. Charles P. Steinmetz at General Electric Co., Schenectady, N. Y., died Feb. 9 in Milwaukee. He was a fellow of the American Institute of Electrical Engineers and of the American Association for the Advancement of Science.

—o—

Miss Robini F. Merrill, 84, vice president and treasurer, E. R. Merrill Spring Co., New York, died Feb. 9 in New Rochelle, N. Y. Miss Merrill was a daughter of Edward R. Merrill, founder of the company.

—o—

Harry E. Jacobs, 66, president, Jacobs Metal Corp., and partner in the Jacobs Bros. White Metals Co., Milwaukee, died Feb. 10 in Phoenix, Ariz.

—o—

Emerson Findley, for 27 years central western manager of *The Iron Age,* died Jan. 31 in Pasadena, Calif., where he had been spending his winters since his retirement in October, 1942.

—o—

Raymond I. Caspers, chairman of the finance committee of Caspers Tin Plate Co., Chicago, died there recently.

—o—

George McLaughlin, 46, production manager, Miller Shelby Products Co., Shelby, O., died there recently.

—o—

Huntington Downer, 57, an executive of Basic Refractories Inc., Cleveland, died Feb. 11 in Ft. Lauderdale, Fla.

Pacific Yards To Shift Emphasis To Ship Repair

New construction has passed peak, survey indicates. Decline in employment sighted. Mechanics will be needed.

SAN FRANCISCO

PACIFIC Coast shipbuilding during 1945 will be characterized by an increasing shift from ship construction to ship repair.

New construction has passed its peak, according to survey by the Federal Reserve Bank. Although current backlog of orders probably will carry most of the larger yards through the year, several are already making preparations to shift to repair work and are reducing labor forces, rearranging work shifts and otherwise adjusting their operations.

With the importance of repair work steadily increasing (more than 5000 merchant vessels have received major repairs at West Coast shipyards during the past three years) mass production methods will decline in importance. Employment-wise, this will lead to an intensified demand for all-around, experienced mechanics instead of large gangs of semi-skilled workers.

Employment Will Decline

Under normal peacetime conditions, commercial shipyard activity can be expected to provide jobs for only a small fraction of the workers currently employed. During a war-to-peace transition period, the bank estimates, which may be put at from two to three years, approximately 100,000 jobs may be provided. However, when shipyards settle down to normal operations, after completing postponed repair and maintenance work, and removing guns and other special war installations, private shipyard employment may be expected to decline to around 30,000 in a year of good business conditions.

Private yards' immediate problem is holding their work force intact by counteracting the tendency for workers to drift away to other jobs and localities.

Little intention was found to be held by major shipyard operators to purchase the government-owned yards and facilities for private postwar operation or for conversion to the manufacture of other products.

Pacific Coast shipbuilders have built nearly 2000 new merchant vessels.

The naval and military program, initiated in 1940, was impressive also. Contracts approximating $3 billion were placed with private Pacific Coast shipyards, comprising a wide range of vessels of the intermediate and smaller types, including light cruisers, destroyers, repair ships, mine layers, and mine sweepers, submarine chasers, destroyer escorts, landing barges, aircraft carriers, salvage vessels, tugs and floating drydocks.

Employment was expanded in private yards from less than 7000 in 1939 to more than 500,000 four years later; around 400,000 are employed at present. During this period the government Navy yards have likewise increased their employment, from less than 10,000 at the beginning of 1939 to around 100,000 at the end of 1944.

Approximately $230 million have been invested in shipbuilding facilities in plants participating in the Maritime Commission program for the West Coast.

MOTORIZED CAFETERIAS: Workers at California Shipbuilding Corp. have this mechanized corps to provide food in the yards. Thirty tractor and trailer units serve the 35,000 shipbuilders. The units are manned by 180 girls. NEA photo

Los Angeles Chamber Forms Steel Committee

LOS ANGELES

Formation of a Steel committee to co-operate with the recently organized Western States Council in the development of the western steel industry has been completed by the local chamber of commerce. The committee is headed by Alden Roach, president, Consolidated Steel Corp.

Members of the committee, in addition to Mr. Roach, are: LeRoy M. Edwards, vice president and general manager, Pacific Lighting Corp.; W. C. Mullendore, executive vice president, Southern California Edison Co.; Leonard E. Read, general manager, Los Angeles chamber; G. A. Axelson, chairman, Axelson Mfg. Co.

John E. Barber, Consolidated Steel Corp.; C. E. Bradburn, president, Pacific Iron & Steel Co.; B. Bronzan, general manager, Baash-Ross Tool Co.; W. A. Buehler, general manager, Buehler Tank & Welding Works; E. S. Dulin, Byron Jackson Co.; William H. Guild, executive assistant, Union Pacific Railroad; B. A. Hinckley, president, General Water Heater Corp.

Kenneth T. Norris, Norris Stamping & Mfg. Co.; George J. O'Brien, vice president, Standard Oil Co. of Calif.; D. P. O'Keefe, president, O'Keefe & Merritt Co.; Morris B. Pendleton, president, Plomb Tool Co.; John Rauen, U. S. Spring & Bumper Co.; Robert Miller, Southwestern Engineering Co.; Emerson Spear, Pacific Wire Rope Co.; Carlton B. Tibbetts, president, Los Angeles Steel Casting Co.; and James F. Bone, secretary of the committee and manager of the industrial department, Los Angeles chamber.

Rheem To Manufacture Heavy Shells in Nevada

SAN FRANCISCO

Rheem Mfg. Co. has been awarded a contract by the San Francisco Ordnance District to forge 105-millimeter artillery shells at Las Vegas, Nev. The operation will be housed in the presently idle buildings of Basic Magnesium Inc.

The Rheem company is already setting up to manufacture, at Basic Magnesium, Navy rocket projectile bodies and Army 81-millimeter trench mortar shells.

When the three contracts are in full production, they will require approximately 1000 employes. The buildings being utilized are largely warehouse structures.

WING TIPS

Ford builds impulse duct engines for American version of V-1 robot bombs on limited production line system. Intended use not disclosed, although program appears to be too large for purely experimental purposes

IMPULSE duct engines for powering the U. S. version of the German V-1 robot bomb have been in production at plants of Ford Motor Co. for about six months and are being delivered to the Army Air Forces for installation on the bombs themselves, the latter built by Willys-Overland in Toledo, O., under subcontract from Republic Aviation Corp., Farmingdale, N. Y.

Basically, the impulse duct engine resembles a large oil burner, comprising a 10-foot steel tube, 20-inch diameter at the front and 15-inch at the rear, in the front of which is mounted a grid section with spring steel flaps permitting it to be open or closed to inrushing air, and nine fuel jets mounted in the grid. Power of the engine derives from the reactive force of the flaming jet emerging from the rear of the tube, and is calculated to be in the neighborhood of 600 horsepower or enough to propel the 2-ton bomb at a speed in the range of 300-350 miles per hour. Operational life of the expendable engine is placed at around 30 minutes average, although on tests, some have been operated continuously for as long as 105 minutes.

Ford has set up one section of its aluminum foundry to house the engine manufacture which is on a limited production line basis. Tubular sections are rolled to cylindrical shape on forming rolls and arc welded in specially designed holding fixtures and jigs which permit rotating the piece during welding. The forward cylindrical section, 20 inches in diameter and 18 inches long, is joined to a tapered or venturi section about 2 feet in length, and this in turn is welded to the tail section, 15 inches in diameter and about 5 feet long. To accommodate the rectangular grid assembly on the forward end, a special stamped steel adapter section is provided, and over it is fitted a streamlined nose cowling, also of steel. All the tube sections are of ⅛-inch hot rolled low-carbon steel strip.

The grid and fuel jet assembly is most interesting, being a radical departure from anything of its type yet conceived in this country. It is patterned closely from the original German design. The grid is made up of 15 die cast aluminum elements, each about 20 inches long, 2 inches wide and 1 inch thick. Each strip has a series of small curved vanes against which the spring steel flaps bear to close the grid. Between each die cast element is a strip of cold-rolled steel to both sides of which are riveted the spring steel flaps, bent at such an angle that they will be in the closed position when assembled. Reference to the accompanying illustration of assembling a grid unit will clarify its construction. The die cast sections and the flap assemblies are held securely by steel tie rods and two sand cast aluminum end plates. Three of the sections have integrally cast bosses for receiving the nine fuel jets. The entire grid unit is bolted to the adapter ring at the nose of the engine tube.

The jets are carefully machined and matched before installation. They are in two pieces — a diffuser core of stainless steel screwed into an aluminum housing. Two small slots at the end of the steel core are positioned in such a way as to give a whirling motion to the emerging spray of fuel. Gasoline is fed to the jets

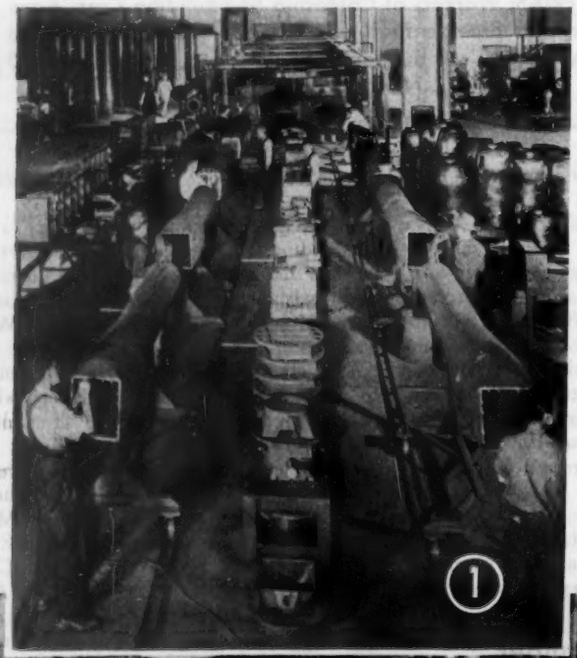


Fig. 1—Engine tubes on assembly line. Those in the foreground are ready to receive the mounting ring for the jet and grid assembly

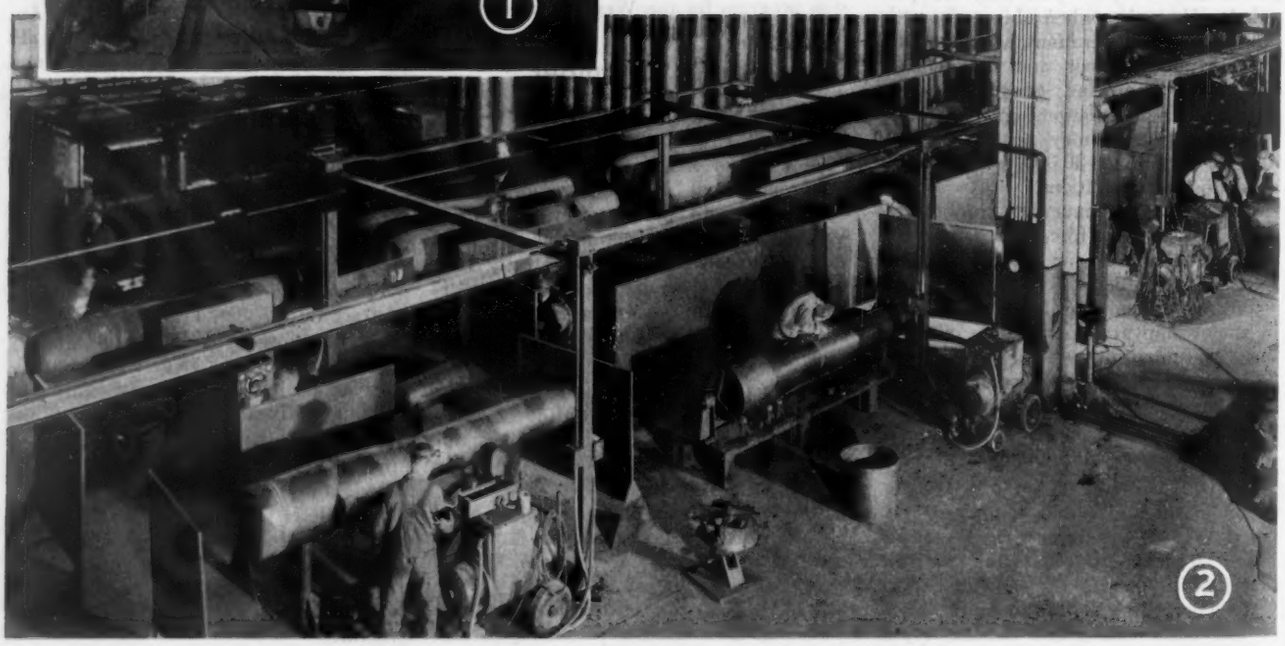
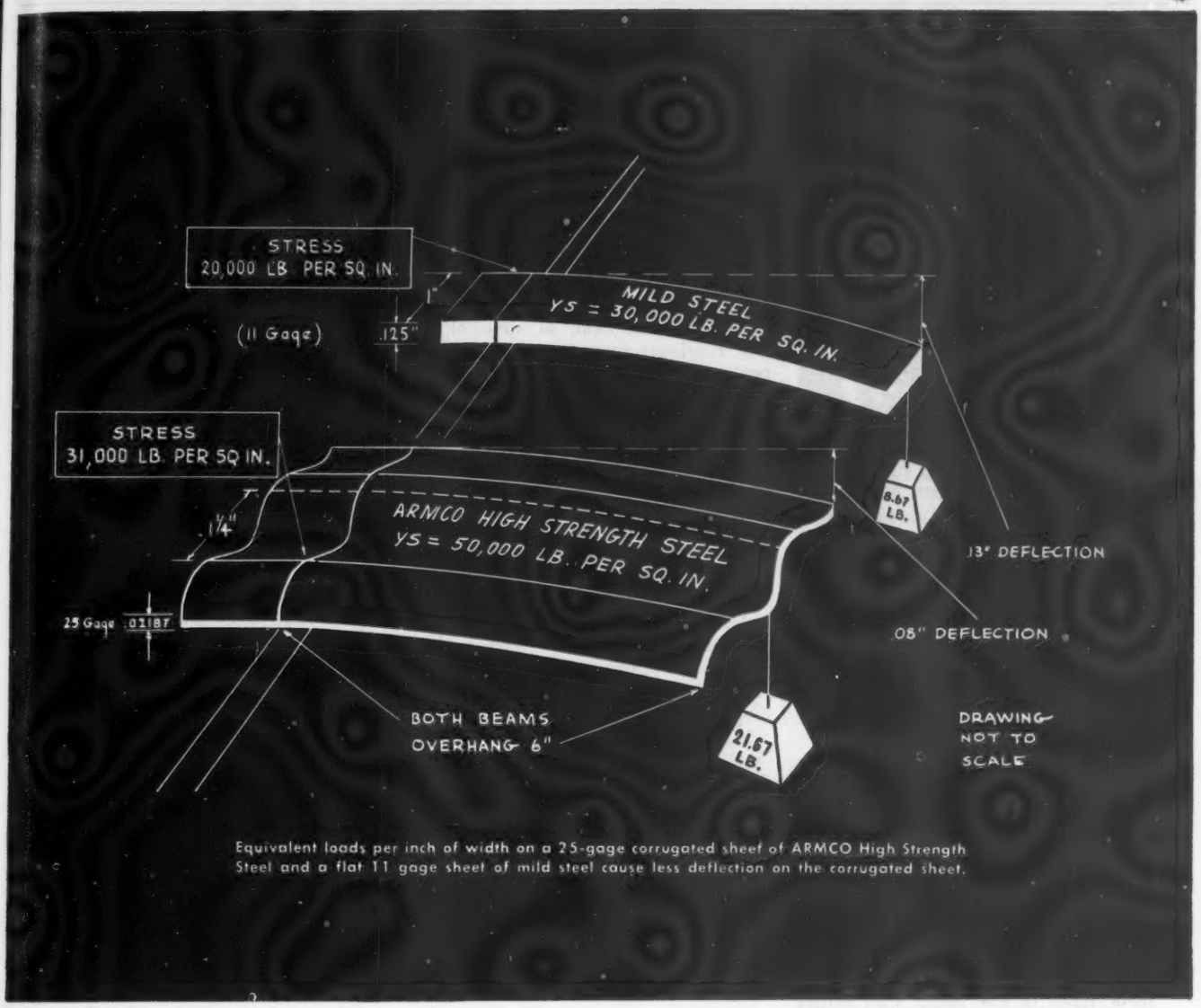


Fig. 2 — Individual booths for welding the tube components. In the background are stores of partially finished tubes. Workers have dubbed the engine the "flying chimney"



Equivalent loads per inch of width on a 25-gage corrugated sheet of ARMCO High Strength Steel and a flat 11 gage sheet of mild steel cause less deflection on the corrugated sheet.

You get strong, light structures

WITH THESE SPECIAL STEELS

Higher yield strengths of ARMCO Low-Alloy High Strength Steels give engineers an opportunity to design new or improved products that combine greater durability and efficiency with less dead weight.

The drawing illustrates one method of utilizing these higher yield strengths. A thin 25 gage corrugated sheet of ARMCO High Strength Steel weighted with 21.67 pounds deflects less than a thick 11 gage flat sheet of mild steel weighted with an equivalent load per inch of width of 8.67 pounds. Because of its higher yield strength it is practical to stress the High Strength Steels to 31,000 psi. as compared to 20,000 psi. for mild steel.

This increased rigidity can be achieved in other ways than by corrugations. Sometimes the sheet is ribbed or embossed, or separate rib-stiffeners are used. These may be used in such forms as angles, channels or hat-sections. In monocoque, or "frameless" construction, the shell is usually reinforced against buckling by ribs or "stringers" between bulkhead rings.

Besides being stronger, ARMCO 50Y and 55Y High Strength Steels have greater resistance to atmospheric corrosion than ordinary steel.

There are other ARMCO Steels to help you sell more efficient and more attractive products after the war . . . Stainless Steels for appearance, strength and rustless construction; ARMCO PAINTGRIP grades for long paint life; and ZINCGRIP for complete zinc protection of severely formed parts. For complete information on any of these special grades just address The American Rolling Mill Company, 581 Curtis St., Middletown, O.

SPECIAL PURPOSE ★ ARMCO ★ SHEET METALS

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

THE AMERICAN ROLLING MILL COMPANY

Fig. 3—Details of the grid assembly, showing how die cast aluminum elements are "stacked" on steel tie rods, with spring steel flap valves between them. Bored bosses in the grid are for receiving the fuel jets and air impact tubes.

through a manifold of copper-clad steel tubing silver soldered to the jets. A further refinement is the installation of three small impact air tubes above the top three jets. Internal air pressure resulting from combustion is used to control a fuel metering device by connecting these tubes to the meter with tubing.

The metering device, which might be likened in a sense to a carburetor, is a device added to the original robomb design by the Germans, in an effort to get more precise control of fuel supply by regulating the air pressure feeding the fuel. This pressure comes from compressed air carried at high pressure in two spherical wire-wound bottles carried in the bomb. It is reduced to 10 pounds for idling speed, when gasoline is burned at a rate of 1470 pounds per hour; and to 37.5 pounds for "open throttle" when fuel is burned at a rate of 2940 pounds per hour. Thus it is readily seen the robomb engine could hardly be called economical in terms of gasoline consumption, in spite of the fact it delivers approximately two horsepower of propulsive effort for each of its 300 pounds of weight.

Cycle of the impulse duct engine is roughly as follows: It will not function until the inrushing air stream is built up to the equivalent of 140 miles per hour speed. The air blast is mixed with the fuel spray and ignited initially by a spark plug (energized by batteries). Force of the resulting combustion is sufficient to hold the spring steel flap valves closed momentarily, shutting off the air supply. As the pressure drops following the exhausting of products of combustion through the rear of the tube, the incoming air blast opens the valves and the cycle is repeated. The engine operates at approximately 43 cycles per second, and the roar is deafening, even at a distance of 25 feet from the test stand. To test the engine, it is mounted on a car held firmly in position on tracks. Large fans generate sufficient air blast in a duct ahead of the nose of the engine to energize it. Forward motion of the engine is restrained by the framework of the car and test stand which is arranged so that measurement of the forward thrust can be effected.

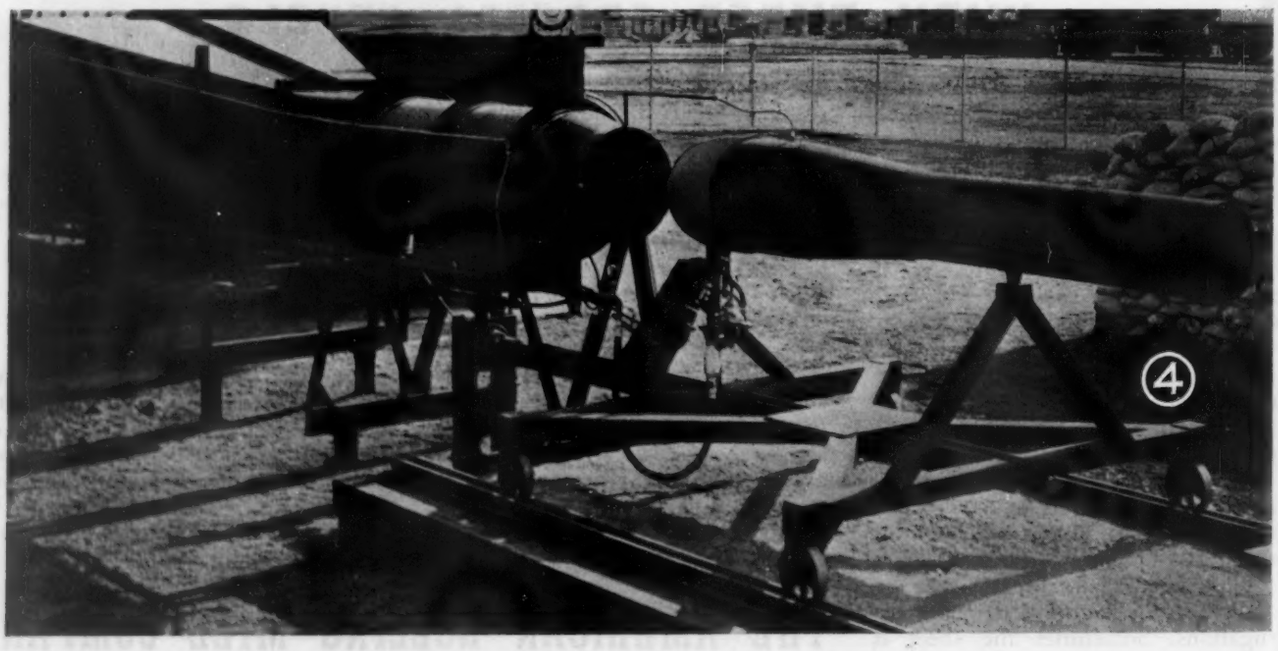
As yet nothing can be said of the intended use of these U. S.-built robot bombs, although it would appear to be a program of more than experimental nature. Recent news photographs showed the launching of the bomb from a railed track about 150 feet long at a Florida test station. Four powder rockets are attached to the underside of the bomb to build up initial speed on the launching track, the rocket assembly falling off after the bomb takes to the air. The Germans apparently are continuing the use of the V-1 bombs in western Europe, one of the latest innovations being the installation of a gyrocompass in the nose to permit flight at extremely low level, almost at treetop height, greatly increasing the difficulty of defensive measures.

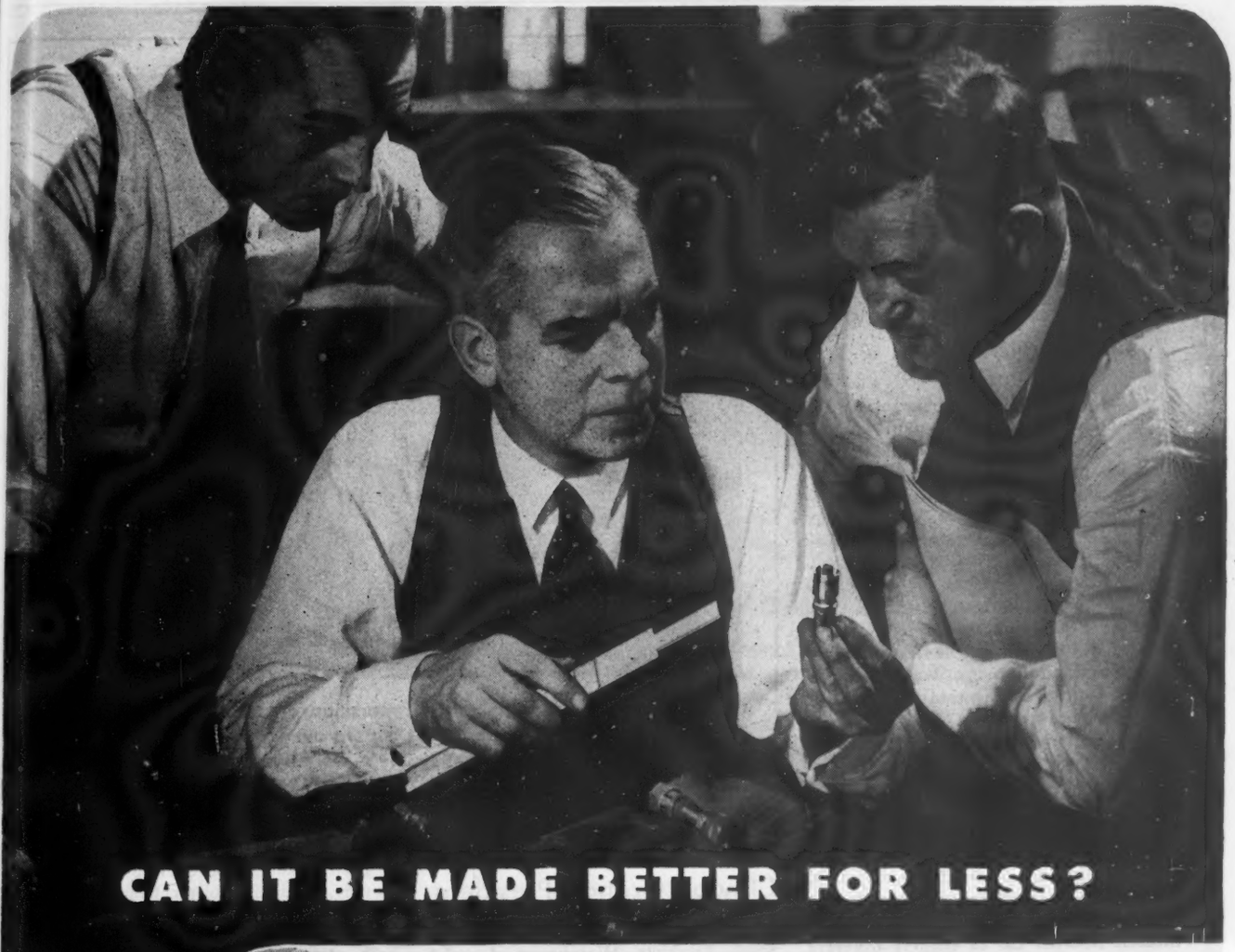
Accuracy of the robot bomb is not particularly good, and it is usually necessary to get an observation or indication of where the first one strikes, to correct the aiming of subsequent firings. One way the Germans have done this is to install radio signaling equipment in the first bomb, thus permitting it to be tracked to its destination. Practical range of the weapon at its present stage of development is around 150-200 miles, and the normal war head has contained about one gross ton of explosive.

Asserts Army Should Scrap Fourth of Planes Yearly

One-fourth of the Army's aircraft should be scrapped yearly after the war to facilitate progress in development by private industry, Eugene E. Wilson, official of the United Aircraft Corp., East Hartford, Conn., and head of the Aeronautical Chamber of Commerce of America, said recently.

Fig. 4—Engine mounted on test stand, duct at left supplying air blast necessary to the functioning of the engine





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Pullman Prepares To Produce Cars For Postwar Use

Builder of railway equipment announces several million dollar program of modernization and construction

SEVERAL MILLION dollar modernization and construction program to prepare its plants for speedy production of railway equipment, including newly-designed cars embodying revolutionary concepts of passenger accommodations, has been announced by Pullman-Standard Car Mfg. Co., Chicago.

The program embraces all six of the company's plants and includes new construction, installation of new equipment, renovations of buildings and machinery, alterations for improving working conditions and rearrangement of facilities for most efficient operation.

The company is prepared to produce, as soon as war conditions permit, wholly new types of cars that are expected to aid the railroads in retaining a substantial part of their heavy wartime passenger traffic by increasing travel comfort.

One of these new cars is a combination bar-lounge car designed for transformation into a smart night club and movie theater. Another car of entirely different design is the "day-nite" coach, equipped with a revolutionary type seat providing increased restfulness during the day and chaise longue sleeping comfort and semi-privacy at night.

Coach Has Three Levels

A third car is a diner which employs an attractive diagonal seating arrangement that permits patrons to enter and leave any seat without disturbing others. A fourth type of car introducing a new principle of space utilization is the "threedex" coach seating 112 passengers and built on three separate levels. It also has card nooks and multiple washrooms.

New kinds of sleeping cars include the duplex-roomette, a car of 24 individual rooms having private toilet and washing facilities, and costing, it is expected, little, if any, more than a lower berth and the three-tier sleeper whose high capacity of 42 berths is intended to reduce the cost of sleeping accommodations.

A new method has been designed to relieve passengers of all worry about baggage. This system calls for central storage on the train, with loading and unloading through the side of a car.

Improved insulation and air conditioning will seal out noises, and an advanced type of truck will reduce car sway at high speeds. Electrically controlled brakes will stop trains automatically and faster, smoother and safer than ever before.

QUICK REPAIR JOB: Efficient preparations enabled Cooper-Bessemer Corp., Mt. Vernon, O., to repair its cupola over a week-end, with the loss of only one day's working time

Warehouse Group Elects Clayton Grandy President

Clayton Grandy, executive secretary, Steel Products Warehouse Association Inc., Cleveland, has been elected to a new position that combines the office of president and executive secretary of the association.

By his election to presidency, Mr. Grandy also becomes chairman of the board and of the executive committee to which were named W. E. Thoresen, Great Western Steel Co., Chicago; J. B. Ribakoff, Reliance Steel Division, Detroit Steel Corp., Cleveland; and J. E. Lavine, Union Steel Supply Co., Warren, O.

Other officers named are: First vice president, Joseph Gendelman, National Sheet Steel Co., Detroit; second vice president, S. M. Friedman, Nottingham Steel Co., Cleveland; secretary, Thomas J. Reid, Century Steel Co., Chicago; and treasurer, Harry Resnick, Universal Steel Co., Cleveland.

Association trustees elected are: Mr. Thoresen, Mr. Ribakoff, Mr. Lavine; H. W. Angsten, Corey Steel Co., Chicago; Harry F. Alpirn, Briggs & Turivas, Chicago; Maxwell Jospey, Production Steel Co., Detroit; J. W. Kratze, Todd Steel Corp., Detroit; Donald C. Lott, Tin Mill Products Corp., Pittsburgh; and J. D. Finnegan, Hynes Steel Products Co., Youngstown, O. National officers of the association also are trustees.

Five additional warehouse distributors have been elected to membership in the association. The companies and voting representatives are: Sol H. Friedman, Sol H. Friedman Co., Cleveland and Detroit; J. R. Russell, Steel Service Inc., Steubenville, O.; H. A. Polster, General Steel Co., Cleveland; P. A. Riskind, Chicago Metals Co., Chicago; and Gustav R. Rich, Rich Steel Co., Los Angeles.

Vlchek Tool Co. Observes Fiftieth Year of Business

Vlchek Tool Co., Cleveland, observed its fiftieth anniversary Feb. 17 with a dinner for 600 of its employes.

The Vlchek plant grew conservatively until the automotive industry began its great expansion. Taking an active part in the servicing and equipping of this industry, Vlchek expanded with it into one of the largest drop forged tool manufacturing plants.

Since Pearl Harbor practically all of the company's output has gone directly to the Air Corps or to the manufacturers of half-tracs, tanks, and military trucks.

McInnes Steel Co. Observes Fiftieth Year of Business

McInnes Steel Co., Corry, Pa., observed its fiftieth anniversary on Feb. 10 with a dinner for its employes.

Business developed by the firm's sales offices at Pittsburgh, Cincinnati, Cleveland, Detroit, and Buffalo, coupled with war production in the past four years, has so increased the demand for McInnes products that much equipment has been added to the Corry plant.

Contract Tool And Die Trade Study Completed

Unusual economic and operating characteristics of the industry analyzed. Postwar problems command attention

THE unusual economic and operating characteristics of the contract tool and die industry are analyzed in a study, "The Tool and Die Industry Comes of Age," issued last week by the National Tool and Die Manufacturers Association, Cleveland, and the Chicago Tool and Die Institute.

It provides background material and statistics necessary for a thorough analysis of operations and recommendations for helping the industry face postwar problems.

Despite its comparatively small sales volume, the report states, this highly specialized industry of 5000 shops is essential to virtually every implement of war or peace, whether wood, metal or plastics. It is probably the only industry that exists almost wholly on the sale of special, custom-made products, according to the authors, William R. White Jr., vice president in charge of production, Midwestern Tool Co., Chicago, and Stuart H. Sinclair, sales manager, Federal Tool Corp., Chicago.

Extremely busy during the intensive tooling-up periods that precede industry's large-scale production, the special tool and die shops swing a wide pendulum of sharp peaks at the beginning of prosperous periods and then suddenly dip into a deep valley of losses. When the overflow recedes, the special tool and die industry's own customers become competitors.

Spreading of Business Suggestions

The study points out that one of the great needs of the industry is a leveling off of the sudden rises and sharp falls. A method suggested is through development of more diversified customers whose peak needs would be spread across the months of the year.

While the tool and die shops have developed their engineering skills to a high degree, the commercial phases of the business have not kept pace and the authors predict that unless the marketing of peacetime capabilities is stepped up, the industry will fall short of its opportunities.

The study also emphasizes that the 1936-39 index period normally used by the government in determining the normal profits upon which it bases excess profits, places the tool and die industry in a difficult financial position to avoid expected postwar recessions.

WINS "E": Charles A. Simmons Jr., left, vice president and general manager, Simmons Machine Tool Corp., Albany, N. Y., shows Pat Bruno, superintendent, a letter from Under Secretary of War Robert P. Patterson announcing the award of the fourth Army-Navy "E" star to Simmons employes

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Vierling Steel Works, Chicago, sustained $150,000 fire damage Feb. 9 when one of its six buildings was damaged after explosions in a paint trough. The plant was operating on a 24-hour schedule producing parts for portable invasion bridges for the Army.

—o—

Beatrice Steel Tank Mfg. Co., Beatrice, Nebr., suffered $500,000 damage by fire that damaged the larger of two principal plants.

—o—

Philco Corp., Philadelphia, will expand its activities as soon as war conditions permit to include production of household freezer chests.

—o—

Alloy Rods Co., York, Pa., has appointed Norton Welding Equipment Co., Milwaukee, as its exclusive distributor for Wisconsin and the Minneapolis-St. Paul area.

—o—

Jones Machine Tool Co., Cincinnati, is changing from a partnership to a corporation. The partnership had been between Harry C. and William F. Jones, and these two, with William F. Meyer, are incorporators.

—o—

The Crosley Corp., Cincinnati, will make a new line of steel kitchen cabinets and sinks as soon as production is permitted, and has appointed E. A. Bonneville as kitchen cabinet product manager.

—o—

American Valve & Enameling Corp., Indianapolis, sustained fire damage of about $50,000. Included in the loss was machinery for applying enamel to Army and Navy airplanes.

—o—

General Precision Equipment Corp., New York, has acquired all of the stock of the Askania Regulator Co., Chicago.

—o—

Hardinge Bros. Inc., Elmira, N. Y., announced its New York city office, formerly operated as Hardinge Sales Co., has become a factory branch and will continue under the management of Frank Suess.

—o—

Kennametal Inc., Latrobe, Pa., has occupied its newly-constructed office building which provides increased facilities for the company's engineering and research departments.

—o—

Stearns Magnetic Mfg. Co., Milwaukee, has announced a sweeping magnet for use on factory areas, parking lots, and similar places where scrap metal may damage rubber tires.

—o—

Link-Belt Co., Chicago, has moved its Huntington, W. Va., office to the West Virginia building.

THE BUSINESS TREND

Business Indexes Reflect Transportation Tie-Ups

DIRECT war output has held up very well in recent weeks considering the adverse weather conditions which have severely restricted the movement of freight, plus shortages of industrial gas and coal supplies. Northeastern states have been most affected, where transportation tie-ups have slowed shipments and have restricted output temporarily in the iron and steel, textile, chemical, and paper processing industries.

Declines were noted in steel ingot production, electric power consumption, bituminous coal output, engineering construction, revenue freight carloadings, and loans and investments during the latest period. Plague by manpower shortage and inadequate supplies of coking coal and scrap, the steel industry is currently operating about 90 per cent of capacity, in contrast with 100 per cent at this season last year. Freight traffic has been averaging 50,000 cars below a year ago for some weeks.

COKE OUTPUT—Average daily production of by-product and beehive coke totaled 194,253 net tons during December, a decline of 2.2 per cent from the November daily production rate despite the addition of 63 new Koppers-Becker ovens to coke producing capacity during the period.

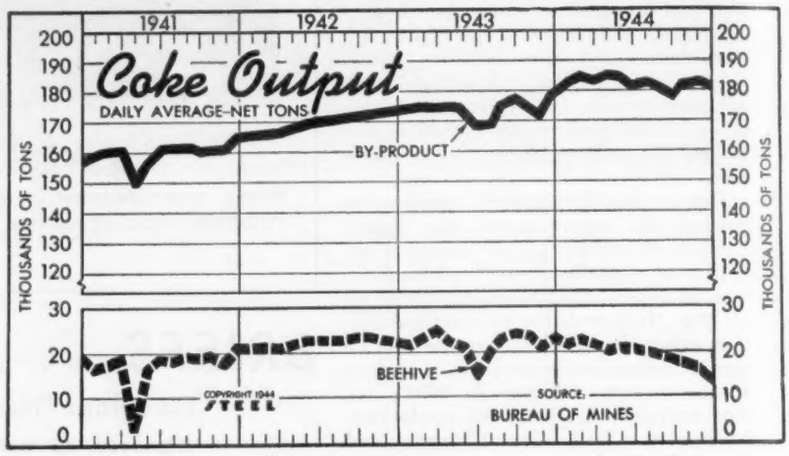
Stocks of by-product coke at producers' plants decreased 48,888 tons during December, and on Jan. 1 last were equivalent to 6.4 days' production at the December rate. Stocks of coking coal at by-product plants decreased 625,904 tons throughout December, and on Jan. 1 last, were sufficient for 23.7 days' supply at the December consumption rate.

EMPLOYMENT—Average number of employes in the steel industry declined last year, although output exceeded the 1943 tonnage. For the year average employment was 571,200 employes, against total employment of 626,000 in 1943. The number of hours worked per week by wage earners averaged 46.7 last year, compared with 43.0 hours per week in preceding year.

The industry's total payrolls in 1944 reached a new peak of $1,745,019,700, an increase of $96 million over the previous year. Hourly and weekly earnings of wage earners also set a new record last year, averaging 121.9 cents per hour and $56.93 per week over the entire year. In 1943, hourly earnings averaged 113.5 cents and weekly earnings $48.81.

LIVING COSTS—Wholesale commodity prices recorded the fourth consecutive monthly increase during December to reach the highest level since February 1921, when the United States Bureau of Labor Statistics' index stood at 104.9. The latest index figure of 104.7 for December, compares with 104.4 in November and 103.2 in corresponding month last year.

The bureau's index on living costs rose to 127 during December, compared with 126.6 in November.



Coke Output
Bureau of Mines
(Daily Average—Net Tons)

	By-Product		Beehive	
	1944	1943	1944	1943
January	182,226	174,044	21,933	21,440
February	184,384	175,099	22,248	23,987
March	183,123	175,051	21,529	24,369
April	185,259	175,857	20,457	22,948
May	184,071	174,400	20,783	21,200
June	181,891	168,900	20,472	14,000
July	181,506	170,100	19,531	20,400
August	181,718	176,800	18,572	23,100
September	179,234	178,090	17,305	25,637
October	181,772	175,492	16,994	23,495
November	182,383	171,594	16,199	20,421
December	180,746	179,200	13,507	22,900
Average	182,359	174,465	19,128	21,795

FIGURES THIS WEEK

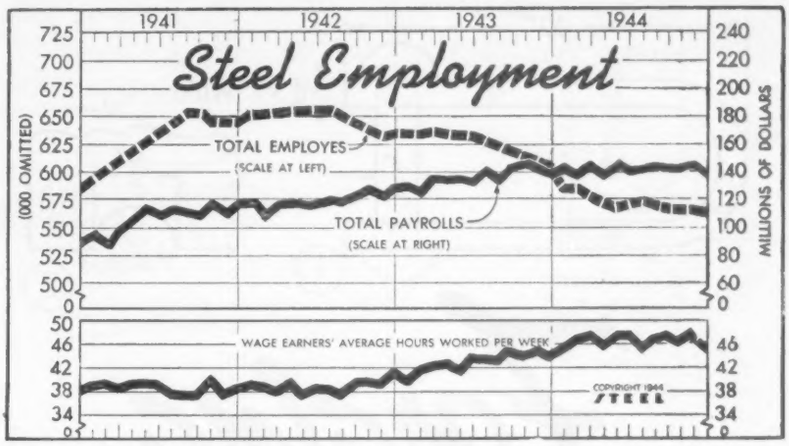
	Latest Period*	Prior Week	Month Ago	Year Ago
INDUSTRY				
Steel Ingot Output (per cent of capacity)	89.5	91.0	94.0	100
Electric Power Distributed (million kilowatt hours)	4,500†	4,539	4,614	4,533
Bituminous Coal Production (daily av.—1000 tons)	1,890	1,937	1,763	2,132
Petroleum Production (daily av.—1000 bbls.)	4,729	4,723	4,723	4,399
Construction Volume (ENR—unit $1,000,000)	$20.6	$28.7	$22.9	$23.2
Automobile and Truck Output (Ward's—number units)	20,960	20,770	19,830	19,095
TRADE				
Freight Carloadings (unit—1000 cars)	730†	739	782	795
Business Failures (Dun & Bradstreet, number)	14	16	25	22
Money in Circulation (in millions of dollars)‡	$25,411	$25,290	$25,257	$20,586
Department Store Sales (change from like week a year ago)‡	+17%	+11%	+12%	+8%

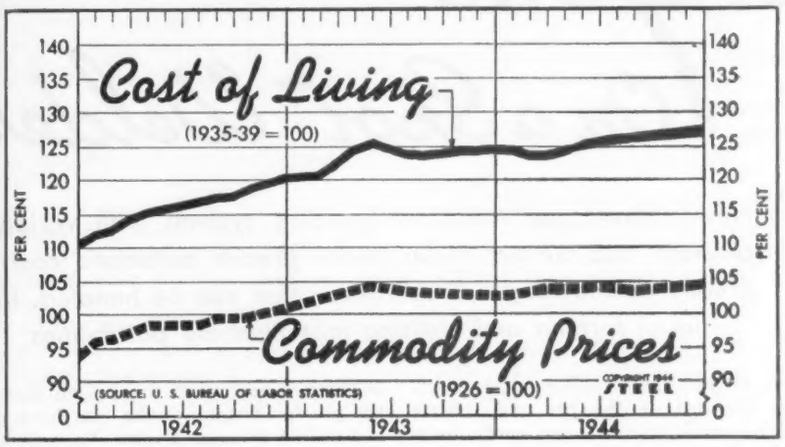
*Dates on request.
†Preliminary. ‡Federal Reserve Board.

Steel Employment

	—Employes— (000 omitted)			—Total Payrolls— (Unit—$1,000,000)		
	1944†	1943	1942	1944	1943	1942
Jan.	583	637	651	$141.8	$129.7	$118.8
Feb.	583	635	651	137.6	122.8	108.5
March	578	637	653	145.3	136.8	117.0
April	573	634	654	138.9	133.3	118.5
May	569	632	656	145.4	137.4	117.4
June	570	631	659	140.5	136.2	118.0
July	571	627	655	141.7	142.8	120.7
Aug.	569	625	647	143.9	139.9	118.7
Sept.	565	620	641	142.2	143.8	124.8
Oct.	564	615	635	141.7	144.9	126.6
Nov.	564	611	632	143.1	141.5	122.8
Dec.	564	605	633	139.9	140.2	129.3

†Monthly average; previous reports showed total number regardless of whether they worked one day or full month.



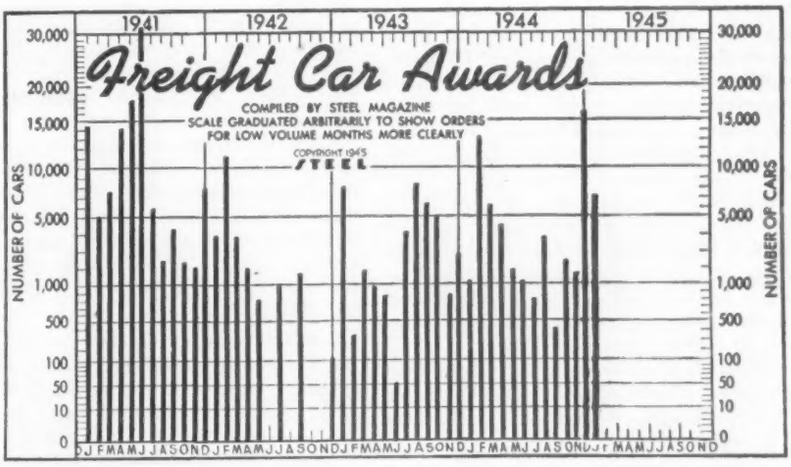


Wholesale Commodity Price—Cost of Living Indexes

	—Commodities— (1926=100)			—Living Costs— (1935-39=100)		
	1944	1943	1942	1944	1943	1942
Jan.	103.3	101.9	96.0	124.2	120.6	112.0
Feb.	103.6	102.5	96.7	123.8	120.9	112.9
Mar.	103.8	103.4	97.6	123.8	122.8	114.3
Apr.	103.9	103.7	98.7	124.6	124.1	115.1
May	104.0	104.1	98.8	125.1	125.1	116.0
June	104.3	103.8	98.6	125.4	124.8	116.4
July	104.1	103.2	98.7	126.1	123.8	117.0
Aug.	103.9	103.1	99.2	126.4	123.2	117.5
Sept.	104.0	103.1	99.6	126.5	123.9	117.8
Oct.	104.1	103.0	100.0	126.5	124.4	119.0
Nov.	104.4	102.9	100.3	126.6	124.1	119.8
Dec.	104.7	103.2	101.0	127.0	124.4	120.4
Ave.	104.0	103.2	98.8	125.5	123.5	116.5

Freight Car Awards

	1945	1944	1943	1942
Jan.	7,200	1,020	8,365	4,253
Feb.	....	13,240	350	11,725
March	....	6,510	1,935	4,080
April	....	4,519	1,000	2,125
May	....	1,952	870	822
June	....	1,150	50	0
July	....	795	4,190	1,025
Aug.	....	3,900	8,747	0
Sept.	....	400	6,820	1,863
Oct.	....	2,425	5,258	0
Nov.	....	1,065	870	0
Dec.	....	16,245	2,919	135
Total	....	53,221	41,355	26,028


Freight Car Awards
1941
1942
1943
1944
1945
COMPILED BY STEEL MAGAZINE
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
COPYRIGHT 1945 STEEL
NUMBER OF CARS
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D

FINANCE

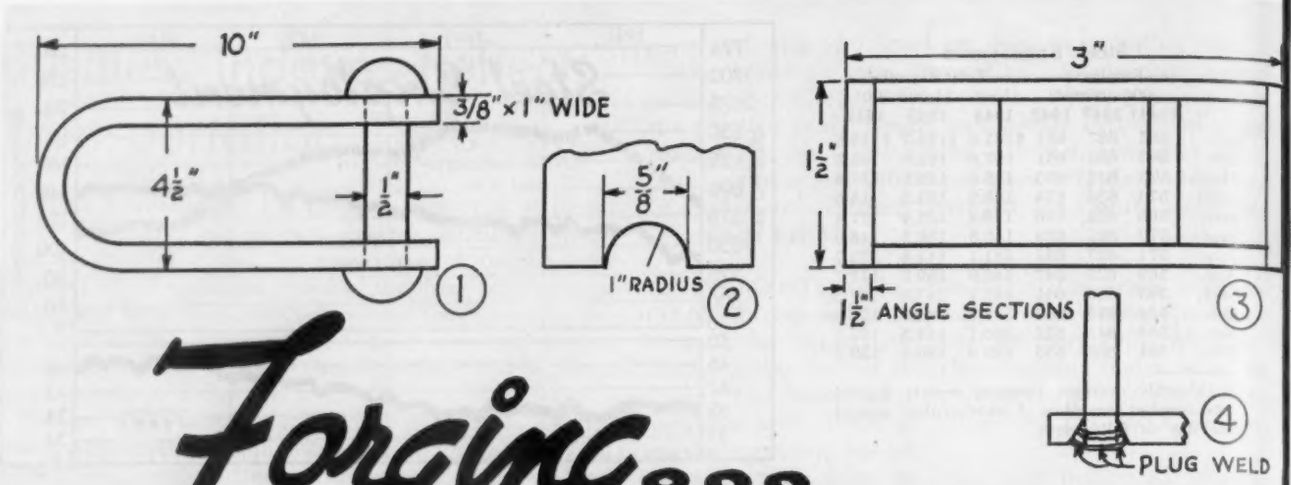
	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,016	$10,964	$11,543	$9,981
Federal Gross Debt (billions)	$233.9	$233.9	$232.8	$182.1
Bond Volume, NYSE (millions)	$48.5	$41.9	$112.5	$87.7
Stocks Sales, NYSE (thousands)	8,112	8,546	11,099	3,512
Loans and Investments (millions)†	$59.2	$59.6	$59.9	$52.2
United States Government Obligations Held (millions)†	$44,257	$44,554	$44,323	$37,930

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$57.55	$57.55	$57.55	$56.73
All Commodities†	104.7	104.7	104.6	103.1
Industrial Raw Materials†	115.3	115.3	115.4	112.4
Manufactured Products†	101.6	101.6	101.3	100.5

†Bureau of Labor's Index, 1926 = 100.



Forging... On a Spot Welder

By G. W. BIRDSALL
Associate Editor, STEEL

Newly developed resistance welding systems with variable pressure and current cycles under precise automatic control greatly extend range of operations that can be handled. Unusual forging and welding jobs illustrate possibilities

RECENT advances in electronic control systems for handling variable pressure and current cycles on resistance welding machines are now being employed to handle jobs formerly thought entirely outside the scope of resistance welding. A large midwestern manufacturer of locomotives and railroad rolling stock has found a number of quite unusual applications for the 135-kilovolt-ampere three-phase-to-single-phase resistance welder recently built for them by Sciaky Brothers, Chicago.

One of the most interesting is the forging or hot heading of clevis pins. The clevis itself is a piece of SAE-1020 bar stock with a rectangular section, ⅜-inch thick and 1 inch wide. This piece is bent to a U-shape as shown in Fig. 1. Overall dimensions of the clevis are approximately 4½ inches wide by 10 inches long.

Through the two ends or legs of the U-shaped piece extends a pin made from ½-inch diameter round bar stock, also SAE-1020. One of the plant engineers, noting the number of unusual jobs that were being handled on the new welder, suggested that possibly it could be adapted to hot forging or upsetting the heads on the clevis pins.

Accordingly an upper electrode was made as shown in Fig. 2 with a ⅝-inch hollowed-out portion having a 1-inch radius to receive the end of the pin. Lower electrode was made in the same way. Work is positioned by an air-operated clamp which grips the central portion of the pin.

In operation, a pin and U-shaped section are assembled into the fixture with about ⅜-inch of the pin extending upward from the U-piece. As the upper electrode is lowered, it fits over the extended end of the pin. Operator steps on the "Start" switch, initiating the automatic current and pressure cycle which heats the end of the pin and softens it so electrode pressure can easily form the head.

Both ends of the pin are "headed" simultaneously for the lower die fits over the extended lower end of the pin which is heated, softened and formed like the upper end.

Critical factors that make the operation a success are, first, the accurate time and current control that gives exactly the right current cycle for heating; combined with the second factor, the precise control of electrode pressures through the cycle required for proper upsetting action.

Variable Current Cycle: On this job, the current is varied as follows: First, a preheat current is applied for 2.55 seconds, followed by the main heating "shot" applied for 12 seconds. The three-phase-to-single-phase welder used first converts standard three-phase 60-cycle power to direct current by means of rectifier tubes. This direct current is then reconverted to single-phase alternating current at frequencies from 3 to 25 cycles per second.

In this instance, complete secondary waves are not employed, just half-waves to form impulses. These pulses are 1/15-second long and are spaced 1/6-second apart. The root-mean-square value of each current pulse is approximately 25,000 amperes during the 1.2-second period when maximum current is applied. Using "shots" or pulses of current in this manner allows the heat developed to penetrate into the body of the work and also prevents overheating of the metal at the surface. This is essential as through-heating of the ½-inch diameter pin for forging is the aim here.

Variable Pressure Cycle: Pressure applied to the work during each operation is in the following sequence: At the start of the work cycle, a rather high pressure is employed to break up any scale or rust on the pieces at the points where they contact the electrodes. This high pressure is maintained during the preheating period.

At the end of the 2.55-second preheat, pressure is reduced and held at a lower value during the main heating period of 1.2 seconds. Then maximum pressure of 2540 pounds is exerted on the work to forge the head on the end of the pin. This pressure is applied for 3 seconds, at the end of which period the upper electrode automatically raises to release the work.

Since these current and pressure cycles are controlled automatically by electron tube timers, perfect results are assured on every succeeding piece, once the proper work cycle has been set up on the controls.

Great Versatility: This type of control equipment is available for application of a great variety of current and pressure cycles. Two preheat values, a welding or main heating value, followed by two postheat values can be set up for obtaining almost any desired combination of preheat, welding and postheat treatments.

For example, on the particular machine used here, the heating and forging pressures are adjustable to any value from 850 to 5670 pounds. Duration of the precompression pressure, of the normal welding or upsetting pressure, of

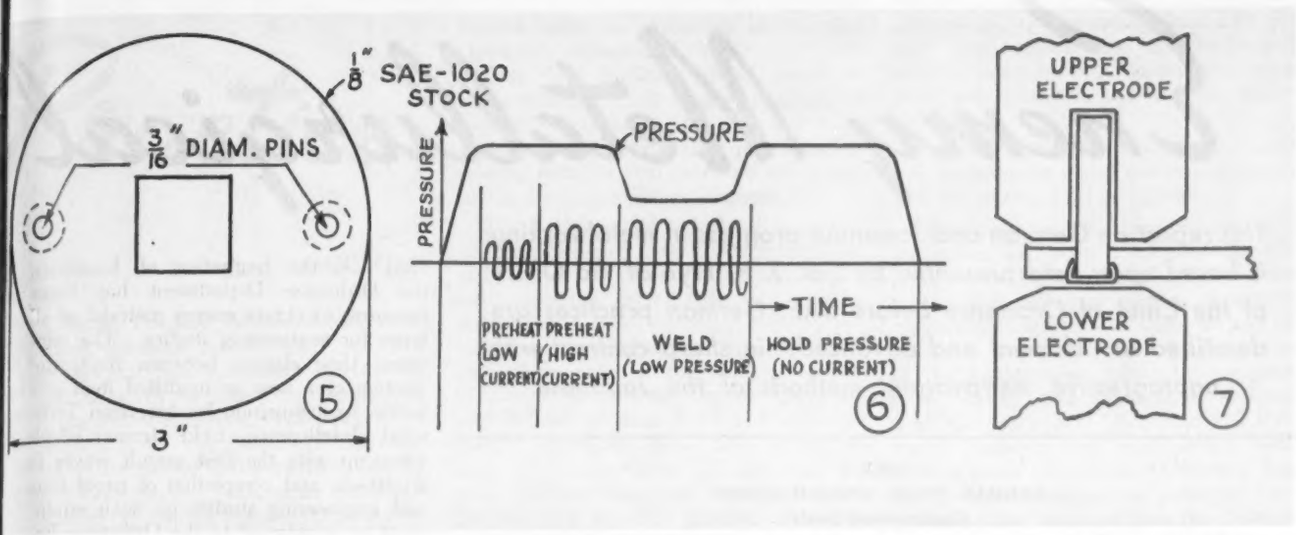


Fig. 1—Both heads on the ½-inch diameter pin in this clevis assembly are headed in a spot welder by a precise cycle of current and pressure application

Fig. 2—Showing section through heading dies used to form ends of clevis pin in Fig. 1. These dies form the electrodes of the welder when doing this work

Fig. 3—Layout of angle sections used to reinforce panels, now spot welded instead of plug welded, saving huge amounts of time in production work

Fig. 4—Section through disk and pin showing former method of making the assembly by means of a plug weld

Fig. 5—Plan view of disk and pins which are forge-welded into holes in disk

Fig. 6—Diagram showing typical pressure and current cycles

Fig. 7—Section through disk and pin as set up for assembling in spot welder. Note upper electrode is hollowed out to receive pin. It contacts pin only at upper end

Fig. 8—Closeup of Sciaky welder with special automatic variable pressure and current controls

the forging pressure, duration of preheat current flow and main heating or welding current flow can each be set at any point from 1/30 to 2/3-second. In addition, the preheat and main heating currents can each be adjusted over a range of eight values.

Forge-Welding: Another unusual application of variable current and pressure cycles combines elements of both forging and welding to fasten the pins in the disk, Fig. 5. This 3-inch disk is made from ⅛-inch SAE-1020 stock and has two 3/16-inch diameter pins through it as shown.

Formerly these were fastened in place by depositing weld metal to fill up the counterbore and the space left by not allowing the pin to extend clear through to the back of the plate, as shown in Fig. 4. However, this required considerable hand work and was not a high production operation.

Now the versatile spot welder has been adapted to handle this work at high output rates, since a pin can be fastened securely in place by the improved method in a few seconds' time. As shown in Fig. 7, the upper electrode is drilled to take the pin. Depth of this hole is such that the pin extends through the back of the circular plate a small distance when pin is bedded in the upper electrode.

And the counterbore used is somewhat smaller than before.

As current is applied to the pin in the enclosed electrode, the lower end of the pin extending through the plate becomes heated rapidly, mushrooms out to fill the counterbore and then a heavy slug of current welds the entire assembly together. Pressure cycle varies from high pressure at start, low pressure during heating, ending up with high pressure at the end.

Enclosing the upper portion of pin

(*Please turn to Page* 146)

Enemy Metallurgical P

This report on German and Japanese progress in metalworking is based upon data presented by Col. J. H. Frye of the Office of the Chief of Ordnance before SAE. German practices are described as "efficient and advanced," in sharp contrast with unprogressive, extravagant methods of the Japanese

SINCE the beginning of hostilities, the Ordnance Department has taken measures to obtain enemy materiel of all types for engineering studies. The minimum time elapses between the introduction of a new or modified item into battle, its acquisition by American Technical Intelligence field teams which move up with the first assault waves in an attack, and completion of proof tests and engineering studies on such equipment as is shipped to the Ordnance Research and Development Center, Aberdeen Proving Ground, Maryland. The Technical Intelligence Branch, Research and Materials Division of the Research and Development Service, has received and examined over 1400 different types of enemy weapons, ammunition and automotive vehicles.

Among these studies are some which concern metallurgical and materials engineering. Results permit conclusions to be drawn as to the following: (1) Raw materials supply situation of enemy nations; (2) selection and application of materials and processing methods; (3) quality of materials and end products; and (4) new materials and processes.

Copy Chevrolet—Examination of Japanese vehicles (specifically, a 1½-ton cargo truck which is an almost exact copy of the 1939 Chevrolet, and a light tank reveals reasonably good quality in both materials and workmanship. Steel mill products indicate satisfactory practices; forged products conform to accepted standards; castings generally were found to be substandard, particularly light metal castings which show a limited experience with production and use of such metals. According to our standards, there is no evidence of new developments in materials and processes, but the necessity for meeting the requirements of their war economy is likely to cause intensive research and planning.

From these investigations it appears that the Japanese have been drawing upon their stockpile of prewar finished materiel, and many of the captured automotive vehicles may not be representative of their war-production capabilities.

Jap Metallurgy Crude—Other items are "reasonably exact facsimiles" of American products, even down to accessories. It is not feasible to draw up-to-date conclusions, but it appears from the Japanese ferroalloy supply situation that it will be necessary to make adjustments in their alloy steel chemistries. Their metallurgy, as indicated by the vehicles examined, is crude in comparison with United States standards. Excessive use of alloys to compensate for the lack of modern metallurgical practices as carburizing, induction and flame-hardening, and other forms of production heat treating, reflects either lack of industrial

TABLE I
GERMAN STEEL SPECIFICATIONS
Constructional Steels

(DIN = German Engineering Specification; E = Carburizing; V = Heat Treating; C = Chromium; Mo = Molybdenum; N = Nickel; M = Manganese; S = Silicon; CV = Chrome-Vanadium)

DIN 1611

Steel A.:
Composition not specified. Sulphur and phosphorus content not guaranteed—St. 00.11 and St. 37.11
Steel B:
Carbon content is not fixed by the purchaser—

Carbon	St. 34.11	St. 42.11	St. 50.11	St. 60.11	St. 70.11
	0.12	0.25	0.35	0.45	0.60

DIN 1661

Carbon Steel Carburizing Grades

Grade		Carbon	Manganese (Max.)	Silicon (Max.)
STc	10.61	.06/.13	0.50	0.53
STc	10.61	.06/.13	0.50	0.35

DIN 1664

Alloy Carburizing Grade (Chrome and Chrome-Manganese)

Grade	Carbon	Manganese	Chromium	Silicon (Max.)
EC 30	0.10/0.16	0.40/0.60	0.30/0.50	0.40
EC 60	0.12/0.18	0.40/0.60	0.60/0.90	0.40
EC 80	0.14/0.19	1.10/1.40	0.80/1.10	0.40
EC 100	0.18/0.23	1.20/1.50	1.20/1.50	0.40

DIN 1663

Alloy Carburizing Grades (Chrome-Moly)

Grade	Carbon	Manganese	Chromium	Moly	Silicon (Max.)
EC Mo 80	0.14/0.20	0.60/0.80	0.80/1.10	0.20/0.30	0.35
EC Mo 100	0.17/0.23	0.80/1.10	1.00/1.30	0.20/0.30	0.35

DIN 1662

Alloy Carburizing Grades (Chrome-Nickel)

Grade	Carbon	Manganese (Max.)	Nickel	Chromium (Max.)	Silicon (Max.)
EN 15	0.10/0.17	0.5	1.25/1.75	0.20	0.35
EN 25	0.10/0.17	0.5	2.25/2.75	0.55/0.95	0.35
ECN 35	0.10/0.17	0.5	3.25/3.75	0.55/0.95	0.35
ECN 45	0.10/0.17	0.5	4.25/4.75	0.90/1.30	0.35

DIN 1661

Plain Carbon Heat Treating Grades

Grade	Carbon (approximately)	Manganese (Max.)	Silicon (Max.)
St C 25.61	0.25	0.80	0.35
St C 35.61	0.35	0.80	0.35
St C 45.61	0.45	0.80	0.35
St C 60.61	0.60	0.80	0.35

DIN 1665

Alloy Heat Treating Grades (Chrome, Chrome-Manganese, Manganese)

Grade	Carbon	Manganese	Chromium	Silicon
VM 125	0.28/0.35	1.20/1.50	.....	0.40 Max.
VM 175	0.33/0.40	1.60/1.90	.....	0.40 Max.
VC 135	0.30/0.37	0.50/0.80	0.90/1.20	0.40 Max.
VMS 135	0.33/0.40	1.10/1.40	.....	1.10/1.40
VMC 140	0.35/0.43	1.00/1.30	1.00/1.30	0.50/0.80
VCV 150	0.45/0.55	0.60/0.90	0.90/1.20 0.10/0.30V	0.40 Max.

DIN 1662

Alloy Heat Treating Grades (Chrome-Nickel)

Grade		Carbon	Manganese	Nickel	Chromium	Silicon (Max.)
VCN 15	Soft	0.25/0.32	0.40/0.80	1.25/1.75	0.30/0.70	0.35
	Hard	0.32/0.40				
VCN 25	Soft	0.25/0.32	0.40/0.80	2.25/2.75	0.55/0.95	0.35
	Hard	0.32/0.40				
VCN 35	Soft	0.20/0.27	0.40/0.80	3.25/3.75	0.55/0.95	0.35
	Hard	0.27/0.35				
VCN 45		0.30/0.40	0.40/0.80	4.25/4.75	1.10/1.50	0.35

DIN 1663

Alloy Heat Treating Grades (Chrome-Moly)

Grade	Carbon	Manganese	Chromium	Moly	Silicon (Max.)
VC Mo 125	0.22/0.29	0.50/0.80	0.90/1.20	0.15/0.25	0.35
VC Mo 135	0.30/0.37	0.50/0.80	0.90/1.20	0.15/0.25	0.35
VC Mo 140	0.38/0.45	0.50/0.80	0.90/1.20	0.15/0.25	0.35
VC Mo 240	0.38/0.45	0.50/0.80	1.60/1.90	0.30/0.40	0.35(.2V)

Practice

know-how or inadequate modern facilities.

German Practice Advanced—By comparison, German metallurgical practices are efficient and advanced. From the data set forth in following paragraphs on the Hitler-sponsored Volkswagen, or "People's Car," the German 8-ton half-track prime mover and personnel carrier, heavy-duty engine, (and other items not classified), Germans apparently have recognized their shortcomings in basic raw materials and have developed usable and satisfactory constructional materials (See Table I) from available resources.

The development of chromium-manganese and chromium-silicon alloy steels provides hardenability without excessive drain on their critical alloys. Ferro-alloys have been conserved by strict enforcement of scrap segregation requirements and, as a result, residual alloys in these parts are in keeping with prewar levels. Technical articles appearing in U. S. technical and trade papers are quoted in German publications, and they undoubtedly are familiar with our means of obtaining hardenability with smaller quantities of three or more alloying elements. There is evidence that the principles of hardenability are understood, and results are achieved by means best suited to their economy.

Forging Tolerances Off—The Germans extensively use forging as a means of fabricating, but seemingly are not able to hold close tolerances, as evidenced by the large amount of machine work performed on the rough blanks. Of particular interest is the hot pressing of ferrous and nonferrous castings to improve structure of the metal. Ferrous and light metal castings also are used extensively and, for soundness and quality, compare with our own high standards.

German heat treating practices are in a highly developed stage and compare favorably with those in this country. Carburizing is used extensively, possibly as a means of conserving ferroalloys, or to produce compression stresses in the surface and to meet other requirements. Flame and induction hardening are applied advantageously in a great number of instances.

The German weapons and vehicles are good and are being constantly improved. In general, they represent modern engineering and design principles. On the other hand, the Japanese have been accumulating stockpiles of finished war materiel for the past 10 or 15 years. Much of this equipment was made in foreign countries, notably Germany, while that made in Japan normally was produced according to standards and designs which were acceptable at the time of their construction. They have not demonstrated ability and ingenuity beyond that commonly expected of them.

Less Steel Available—Brief review of the availability and supply situation of Germany in regard to the principal engineering materials will assist in evaluating existing metallurgical practices and possibly in foreseeing future changes.

The German steel industry has annual capacity of nearly 30,000,000 ingot tons; at height of her successes, potential capacity exceeded 50,000,000 tons. Subsequently, in 1943, bombing, military reverses, skilled labor and transportation difficulties reduced the total to about 35,000,000 ingot tons, Greater Germany and Poland producing all but approximately 10,000,000 tons. It is estimated that, up to a year ago, 9 per cent of total German-controlled European production was in alloy grades. Because much domestic ore contains high phosphorus, extensive bessemer steel production (about 40 per cent of the total) is maintained. Approximately one-half of overall production is open hearth.

An enforced shift from the relatively rich ores imported from Sweden, France and Luxembourg, which previously made up two-thirds of her annual iron ore requirements, to the rather lean (45 per cent iron) native ores no doubt will require some changes in furnace practices and increased use of other materials.

Fewer Ferroalloys—Germany's condition in ferroalloys and nonferrous metals may be summarized as follows:

Manganese, nickel, chromium and molybdenum all were stockpiled heavily prior to war. Domestic production of manganese and nickel in relation to annual requirements amounts to about 15 and 20 per cent, respectively. Large quantities of the former were taken by conquest from Russia, lesser amounts by demand from Czechoslovakia, Italy and the Balkans. Finland, Italy and Greece were main sources for nickel. Germany has no deposits of chromium, principal supply being that obtained from the Balkans and 20 per cent from Turkey. Loss of Finland and the Balkans will deprive the Germans of two-thirds of their limited supply of molybdenum. Before the war, however, she imported heavily from the United States. Military reverses have lost the most important sources for vanadium, but titanium iron ores of Scandinavia, Lorraine Minette deposits and

TABLE II

GERMAN 8 TON HALF-TRACK GEAR COMPOSITIONS AND TREATMENTS*

Gear	ALLOYING ELEMENTS C	Mn	Si	Cr	Mo	HARDNESS (Rockwell C)
Timing Gear	.30	.30	.41	1.47		Case 64 Core 20/22
Universal Spline	.31	1.32	.32	1.59		Case 63/64 Core 46/48
Transmission Gear	.25	1.11	.36	1.16	.17	Case 61/63 Core 42/44
Spline Shaft	.19	.98	.28	1.26	.26	Case 61/63 Core 28/33
Sliding Gear	.19	1.00	.34	.96	.17	Case 61/63 Core 33/36
Pinion Gear and Shaft	.19	.86	.29	1.14	.18	Case 60/64 Core 25/31

*Treatments: All six parts listed above were carburized—timing gear, spline, spline shaft to depth of 0.040-inch; transmission gear to 0.025-inch; sliding gear to 0.020-inch; and pinion gear and shaft to 0.060-inch.

Processing: All parts above were forged except spline shaft. This was made of bar stock.

Composition: Timing gear and universal spline are on formulas VC-135 and EC-100, respectively. Other four are EC-Mo-100.

TABLE III

HEAVY DUTY ENGINE AND TRANSMISSION GEAR COMPOSITIONS

Gear	ALLOYING ELEMENTS C	Mn	Si	Cr	Mo	HARDNESS (Rockwell C)
Dog Clutch (1)	.24	1.32	.31	1.35	.02	Case 64 Core 40/47
Gear (2)	.20	1.31	.31	1.30	.02	Case 62 Core 35
Timing Gear (3)	.25	.40	.25	1.44	.06	Case 62 Core 20
Camshaft Gear (4)	.45	.45	.28	.06	.01	25
Pinion and Shaft (5)	.42	1.23	.01	.07	.01	94
Starter Gear (6)	.28	1.36	.37	.15	.01	17
Clutch Gear (7)	.44	1.26	.68	1.25	.01	33
Sliding Gear (8)	.25	1.31	.24	1.23	.01	Case 63 Core 39
Cluster, Gear Large (9)	.25	1.19	.30	1.25	.01	Case 60 Core 39
Cluster, Gear Small (10)	.20	1.25	.32	1.35	.01	Case 61 Core 44

Processing Methods: Items 1, 6, 7, 8, 9 and 10 are forgings. Items 3 and 5 were produced from bar stock, while item 4 is a forged casting.

Heat Treatment: Items 1, 2, 8, 9 and 10 are carburized to depth of 0.04, 0.02, 0.03 and 0.06-7, respectively.

Composition: Items 1, 2, 8, 9 and 10 are based on formula EC 100, Timing gear is Nitralloy H; pinion-and-shaft and starter gear are VM 125; camshaft gear is St. C. 45.61; and clutch gear is VMC 140.

TABLE IV—GERMAN VOLKSWAGEN FERROUS METALLURGICAL SURVEY

Component and Processing	Chemical Composition C	Mn	P	S	Si	Cu	Ni	Cr	V	Mo	Hardness	Heat Treatment	Remarks
Clutch Release Bearing Arm	0.13	0.44	0.023	0.043	N.D.	0.08	0.08	0.07	0.005*	0.02			Similar to 1015 (German St. C. 16.61).
Ring Gear Bearing													
Inner Race	0.98	0.26	0.012	0.020	0.34	0.07	0.10-0.20	160	0.005*	0.02	Rc 62-63	Quenched & tempered	Similar to NE 52100A.
Balls	1.05	0.35	0.028	0.017	0.29	0.04	0.01	0.46	0.005*	0.01	Rc 63-64	Quenched & tempered	Similar to NE 52100C.
Shifting Forks (Forgings)											Tips Body	Selective Carburized	Similar to 1015
Sliding Gear Shifting Fork	0.15	0.38	0.014	0.040	0.23	0.07	0.06	0.07	0.005*	0.02	Rc 63-65 Rb 81-90	0.015-in. Case	(German St. C. 16.61).
Reverse Sliding Gear Shifting Fork	0.23	0.36	0.013	0.037	0.22	0.07	0.10-0.20	0.07	0.005*	0.02	Rc 63-65 Rb 81-90	Carburized all over 0.010-in. Case hardened	Similar to 1020 (German St. C. 25.6).
Reverse Sliding Gear (Machined from cast blank)	0.40	0.61	0.018	0.022	0.31	0.10-0.20	0.09	1.14	0.005*	0.22	Case Rc 61-63 Core Tooth Rc 52-56 Core Hub Rc 40-44	Carburized 0.010-in. Case	Similar to 4140 except Mn is low and Cr high (German VC-Mo 140).
Shifting Fork Shafts (Bar—Fork rough forged)	0.16	0.42	0.020	0.032	0.30	0.10-0.20	0.04	0.06	0.005*	0.01	Case Rc 62-63 Core Rc 17-21	Carburized 0.020-0.030-in. case	The three shifts were identical. Similar to 1015 (German St. C. 16.61).
Main Shaft Subassembly													
Ball Bearings													
Spur Gears—A (Mach. from forged blank)	0.37	0.57	0.027	0.022	0.25	0.05	0.35	1.05	0.005*	0.19	Case Rc 63-65 Core Rc 49-50	Case hardened 0.008-in case	Similar to X4130 except C is high and Ni content (Close to German VC-Mo 135).
Spur Gears—B (Mach. from tubing or bar)	0.38	0.57	0.019	0.009	0.28	0.10-0.20	0.10-0.20	0.96	0.02	0.24	Case Rc 60-62 Core Rc 46-48	Case hardened 0.008-in case	Similar to X4130 except C is high; note 0.02 V, perhaps added for grain refinement.
Main Shaft (From forged blank)	0.34	0.68	0.014	0.024	0.32	0.07	0.10-0.20	1.09	0.005*	0.20	Rc 49-52	Quenched with low draw	Similar to 4137 except low Mn (German VC-Mo 135).
Driving Pinion and Spline Shaft													
Bearing, double ball													
Outer Race	0.94	0.29	0.014	0.010	0.34	0.08	0.09	1.55	0.005*	0.02	Rc 64-65	Quenched-tempered	Similar to NE 52100A.
Balls	1.07	0.30	0.023	0.017	0.27	0.02	0.01	0.52	0.005*	0.01*	Rc 66	Quenched-tempered	Similar to NE 52100C.
Idler Gears													
Third (Bar stock)	0.32	0.57	0.010	0.007	0.27	0.15-0.20	0.10-0.20	0.91	0.005*	0.24	Case Rc 60-62 Core Rc 51-53	Carburized 0.020-in. case	Similar to X4130 (German VC-Mo 135).
Fourth (Forged blank)	0.39	0.60	0.019	0.019	0.28	0.10-0.15	0.10-0.20	1.02	0.005*	0.19	Case Rc 60-62 Core Rc 51-53	Carburized 0.020-in. case	Similar to 4140 except Mn is low (German VC-Mo 135).
Sliding Gear (Mach. from forged blank)	0.41	0.62	0.019	0.022	0.32	0.10-0.15	0.07	1.14	0.005*	0.22	Case Rc 62-63 Core Rc 50-53	Carburized 0.020-in. case	Similar to 4140 except Mn on low side (German Vc-Mo 140).
Roller Bearing													
Inner Race	1.04	0.26	0.020	0.024	0.40	0.10-0.20	0.08	1.57	0.005*	0.01*	Rc 62-64		Similar to NE 52100A.
Rollers	1.05	0.30	0.021	0.018	0.31	0.02	0.01	0.57	0.005*	0.01*	Rc 64		Similar to NE 52100C.
Spline Shaft and Driving Pinion (Pinion end hot-upset and machined)	0.21	0.92	0.023	0.013	0.31	0.10-0.15	0.34	1.06	0.005*	0.20	Case Rc 62-63 Core Rc 25-27	Carburized 0.015-in. case	Case 0.015-in. deep and approx. 0.015 in. zone uncarburized. (German EC Mo 100 modified).
Axle Shaft, Rear (Bar upset on end)	0.36	0.64	0.026	0.017	0.32	0.10-0.20	0.005	0.82	0.005*	0.14	Rc 26-30 End Rc 45-48	Gradient quenched	Upset and quenched rapidly but not entirely quenched out. Similar to 4137 (German VCM 135).
Crankshaft	0.35	1.12	0.029	0.029	1.18	0.07	0.07	0.25	0.005*	0.01	Rc 56-59 Bearing Areas	Bearing Areas induction hardened	Induction hardening Mn Si steel. (Ger. VMS 135).
Distributor Gear (Machined bar or tubing)	0.47	0.56	0.029	0.022	0.27	0.06	0.05	0.06	0.005*	0.01	Surface Rc 63 Tooth 45/48 Face 41/43	Case hardened 0.005-in. case	Was not fully quenched out. Similar to 1045 except Mn is low (German St. C. 45-61).
Bearing (Bimetallic)													
Backing Material	0.14	0.41	0.029	0.036	0.34	0.05	0.02	0.04	0.005*	0.01	Rb 84-85		Similar to 1015 (St. C. 16-61).
Piston Rings Total	3.68	0.69	0.54	0.06	2.83	0.06	0.05	0.06	0.04	0.01	Rc 22-23		Unusually fine graphite matrix pearlite with appreciable steadite.
(gray iron) Combined	0.69	...	...	...	...	...	...	...					
Connecting Rod (Machined from forging)	0.41	0.82	0.032	0.032	0.21	0.10-0.15	0.07	0.05	0.005	0.01	Surface Rc 21-24 Cross-sec. Rb 90-93	Probably cooled rapidly and stress annealed	Similar to 1040-45 (German St. C. 45.61).
Cam Shaft Total	3.31	0.90	0.12	0.16	2.39	0.15-0.20	0.09	0.08	0.005*	0.01*	On cams Rc 47-48 On shaft Rc 15-22	Cams locally hardened	Probably flame hardened cams.
(Gray iron shaft—white iron bearing surfaces) Combined	0.65	...	...	...	...	.....	...	...					
Exhaust Valve (Head hot-upset)	0.50	0.42	0.010	0.029	2.39	0.08	0.10-0.20	9.20	0.02	0.06	Head Rc 24-26 Stem Rc 31-32	Tip hardened by localized heat treatment	Similar to Poppet Valve type No. 1, 1939, ASM Handbook, p. 534.
Cylinder, Finned Block Total	2.77	0.60	0.16	0.14	2.63	0.15-0.20	0.07	0.08	0.005*	0.01*	Fins Rb 94-96		
(Gray iron) Combined	0.68	...	...	...	...	.....	...	...			Inner wall Rb 91-93		

*Less than

German "Dogger" ores will provide sufficient volume for essential purposes.

As to Germany's supply of nonferrous metals, it is likely that enough bauxite is stockpiled within her borders, together with existing secondary metal and scrap, to permit continued use of aluminum until this industry can be converted to recovery from high-silica clay. Bulk of the supply came from France, Italy, Yugoslavia and Hungary. While some magnesite had been obtained from neighboring states, there should be sufficient domestic magnesium ores and refining facilities to insure continued use in explosives, incendiaries and for constructional purposes. Copper situation is extremely critical, more than one-third of requirements having come from Yugoslavia. Loss of this source, and of Finnish and Turkish supplies, leaves Germany with a mere 15 per cent of total requirements, the latter being supplied locally. Scrap from captured war materiel and that confiscated in subjugated territories, plus a program of substituting aluminum in electrical components, overhead lines and constructional parts, and of using powdered iron and bimetal rotating bands and steel cartridge cases, may enable her to bridge the gap.

Supplies Closely Controlled — There can be no doubt that Germany fully recognized her limitations in raw materials and by various means has so far circumvented this disadvantage. These include intensive scrap collection and segregation, importation and stock-piling, more extensive exploitation of mines, subsidizing foreign mines, allocation of critical materials and parallel regulations and restrictions on use.

Inasmuch as it would be impracticable to discuss the entire range of German automotive vehicles in detail, and discussion of parts and practices of outstanding interest may be misleading, metallurgical practices governing representative items are cross-sectioned. Design principles are discussed only to the extent that metallurgical practices may be influenced.

The Volkswagen, or "Peoples Car," which Hitler sponsored, is a 4-wheeled, rear-axle drive (only) scout or reconnaissance car comparable in size and use with our Jeep. The engine is a 4-cylinder, 4-cycle, horizontally opposed type. Maximum speed is 40 miles per hour and average of 30 miles per gallon of gasoline can be obtained. It is light in weight (1600 pounds), has a central tubular frame with each wheel independently suspended on torsion bars. Transmission and differential are made as one unit flanged to the engine, and this assembly is mounted between two prongs formed by the frame in the rear of the vehicle.

German "Jeep"—Table IV (p. 110) contain abbreviated details of a ferrous metallurgical survey of a Volkswagen manufactured in late 1940 or early 1941. It will be noted that most of the parts are made from steels whose chemistries fall within the specifications shown. From an overall point of view phosphorus and sulphur content of carbon and alloy steels are low, averaging less than 0.040 per cent. The comparatively low alloy residuals are indicative of German efficiency in scrap segregation and remelting practices. There are 2 exceptions: Spur gear in the main shaft assembly and spline shaft and driving pinion, in which nickel content is between 0.30-0.40 per cent. There are no nickel requirements in the specifications EC Mo—100 and VC Mo 135, but in view of the otherwise exceedingly good control over residuals, it is believed that a deliberate modification was made in these instances.

Alloy steels used were confined to VC Mo 125-135-140, EC Mo 100, VMS 135 and VM 175. These grades restrict the alloying elements to manganese, silicon, chromium and molybdenum. The last was used to a greater extent in this vehicle than in others of later production, indicating diminishing stockpiles and wider acceptance of substitute grades. One of the main shaft spur gears had 0.02 per cent vanadium, which might indicate the use of boron, but the latter could not be found by spectrographic analysis.

52100 for Bearings—In this case bearing steels of 52100 composition are used for the inner race, balls and outer race. Races are made from seamless tubing or bar stock while balls are forged. Heat treatment and resultant hardnesses closely match practices in this country. Gear practice for the more highly stressed gears of the transmission assembly and the mainshaft subassembly differs in that medium carbon steels (0.351-0.45 per cent) are carburized to a depth of 0.010-0.025-inch and subsequently quenched from the A —A3 range, followed by low temperature tempering. This produces core hardness values in the range of 40 to 50 rockwell C, which is somewhat higher than commonly used here. The use of light cases on medium carbon steels increases the life materially and this practice is consistent with the latest thinking of our automotive metallurgists. The fact that every gear in the vehicle was carburized and all but two were made from medium carbon steels indicates their general acceptance of this practice. In addition, piston pin and oil sleeve were made from St. C. 45.61, similar to SAE 1045, and carburized, although the core hardness was comparatively soft.

Exhaust valves were made from silchrome type steel, but the analysis of the intake valves is puzzling. These use 1.70 per cent carbon, 12 per cent chromium steel, whereas it is common U. S. practice to use SAE 3140, 4140 or 8640. It is believed that this analysis was used as a matter of expediency, probably to utilize frozen or diverted cutlery steel. The intake and exhaust valves were dimensionally interchangeable and both had the heads hot upset with the tip ends hardened by localized heat treatment.

Fine Grain Gray Iron—Each cylinder of this aircooled engine has an individual finned block made from unalloyed gray iron of unusually sound quality. Micrographs show fins to be fine grained, with uniformly distributed small graphite flakes. The body is essentially pearlitic

(*Please turn to Page* 154)

SHATTER-PROOFING CYLINDERS: To prevent deadly "shrapnelling" of oxygen and carbon dioxide cylinders used aboard U. S. warplanes for breathing and fire fighting purposes, wire is fed under tension at high speed onto the cylinder, and the ends soldered in place. Walter A. Kidde Co. developed this method of preventing the explosion from high internal pressures of untreated cylinders hit by flak or bullets

Trends in th

Judging from the important place welded construction has already assumed in fabrication of machinery parts, the author predicts further extended growth and analyzes the underlying factors responsible in this well-illustrated report also presented before the ASME

By EDWARD J. CHARLTON
Assistant to President
Lukenweld Inc. Division
Lukens Steel Co.
Coatesville, Pa.

Fig. 1—This "riding" ring for a rotary kiln must withstand much wear in service. It measures 12 feet outside diameter, is 8 inches thick, weighs 12 tons

A DISCUSSION of trends in use of components welded from low-carbon hot-rolled steel and its related alloys is timely, for the use of welded machinery parts is about to enter what is perhaps the most important stage in its growth. Use over a period of roughly 15 years since its inception has gained the status of general acceptance for welded machinery parts.

One weldery alone dating from 1930 has produced or collaborated in the design of welded steel machinery parts for nearly 700 different users in 15 industries. These parts have gone into service in 28 states as well as in foreign lands. The basic impetus behind this general acceptance can be divided into two parts: One, economic; the other, engineering.

An additional impetus during the war years has been an abnormal urgency of acquiring necessary parts by any means, as quickly as possible with the result that many times, normal economic justification must have been nonexistent. Doubtless the spread in use of fabricated parts has been accelerated simply because trial samples or educational designs embody them. During the war period great quantities of duplicate weldments have been fabricated while under normal conditions the investment necessary for plants, tooling and other equipment to produce these parts might have awaited economic justification.

Drawing a comparison with the foundry industry, we see the use of cast iron growing steadily in step with the progressive mechanization of industry. Cast steel entered the field as a material vastly superior in its physical properties to any then existing iron. The steel foundry clearly is a child of necessity.

By contrast, the use of welded parts was inaugurated with no clear cut apparent general necessity. Traditional media for producing structural mechanical parts did exist. Hence relatively fine lines of distinction from standpoints of economics and engineering had to be developed. These distinctions were established on the design philosophy of full utilization of the superior properties of rolled steel with the result that an engineering service has developed of necessity as a part of this new industry.

That future trends in the use of welded machinery parts will be based on well-equipped existing welderies is a fairly drawn conclusion, and they will compete by every legitimate means to maintain themselves. War-time production will affect these trends by providing broad statistical service records which have been made under most drastic conditions imaginable. Basic cost data will be available in addition to existing experience in design, methods and quantity tooling. This accelerated development can be compared with pre-war conditions, when contracts covered small quantities. In those years, the complete exploitation of the process by production tooling was not justified.

On the other hand, undoubtedly much misuse of weldments has resulted because of war necessity. Instances of their application because of scarcity of other materials must exist. Criteria established by battle damage possibly has introduced the use of weldments in applications not justified commercially. Inevitably with respect to such applications the trend will be toward reversion to the use of castings.

Without doubt certain changes in design criteria are due, for weldments have been applied to machines, the overall design of which was frozen for one reason or another. Possible superior advantages have been submerged in such applications. Unless the machines are redesigned to realize the full value of welded construction, reversion might occur.

Basic Reason for Trends: Several fundamental basic reasons for normal trends in the use of welded parts apply to the selection of any engineering material and they reflect either economic or engineering concepts or a combination of the two. These reasons are: Comparative first cost, predictability, strength characteristics, need for greater rigidity, weight reduction, wearability, operating efficiency, and natural adaptability.

These factors determine the selection of a material or process, and usually one of them dominates, with the others as lesser influences.

Cost Is Fundamental: Comparative initial cost is the first on the list.

If the design is adequate . . . if it is economical . . . if possible indirect economies have been considered in cost comparisons . . . if the specifications are clear and conclusive . . . this fundamental reason loses its engineering significance. It becomes purely an economic consideration and a function of the purchasing department.

Predictability is Insurance: The second reason is predictability. This can be a matter of insurance as in the open side press frame, Fig. 2. This weldment replaced a fractured cast frame in an

...thlse of... WELDED MACHINERY PARTS

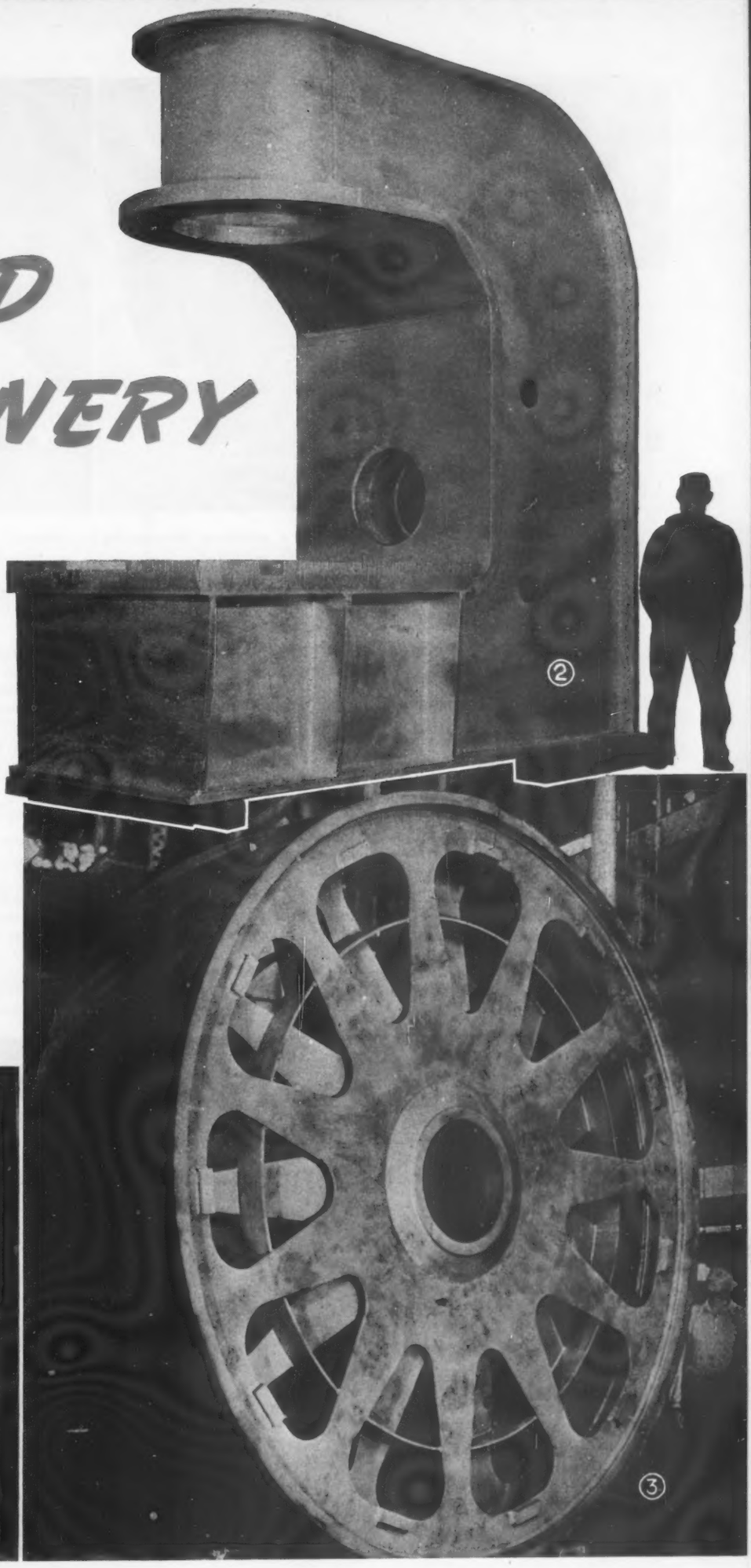


Fig. 2—Housing for a 255-ton joggling press used for crimping plate edges. It measures almost 11 feet long, 5 feet wide and 12 feet high, weighs 33,040 pounds

Fig. 3—Second reduction gear blank for marine drive weighs 25,000 pounds. Note built-up construction that saves many thousands of pounds

Fig. 4—End portion of rotary mixing unit. Hub section and rim are of cast steel, remainder is steel plate. The head is almost 10 feet in diameter, and weighs about 6000 pounds

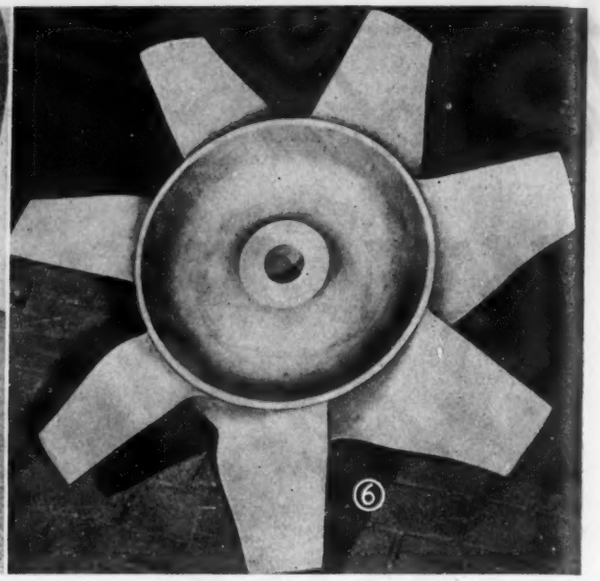


Fig. 5—This gear housing is justified as a weldment because its performance can be accurately predicted

Fig. 6—High speed blower fan employs central forging with forged vanes welded to it. Fans operate at 5000 r.p.m., are tested at 7500 r.p.m.

existing press which had been in operation for a relatively short time. It was installed several years prior to the war.

Such insurance is an economic reason justifying the use of a new type of structure. If the first cost of the weldment exceeded that of the casting, the premium can be considered as that on an insurance policy against failure. Machining, installation and loss of production while the replacement was being built also are cost factors. An obvious trend exists here since weldments are being widely used in such heavy machinery.

Another item involving predictability is rejection or scrappage. We have a small item, Fig. 5, which has been produced by the hundreds. It is hard to conceive that its first cost could compete with that of a casting. The use of this weldment stems from the alleged expenditure of an average of 75 hours for repair on each such casting. This may seem an exaggeration, but on the other hand, it may not since magnaflux was used as an inspection method on both casting and weldment. At any rate, the user of this part apparently feels that a weldment is justified because it offers a considerably higher degree of predictability.

A report on the repair time states that the alleged 75 hours previously necessary have been reduced to 1 or 2 hours on the weldment.

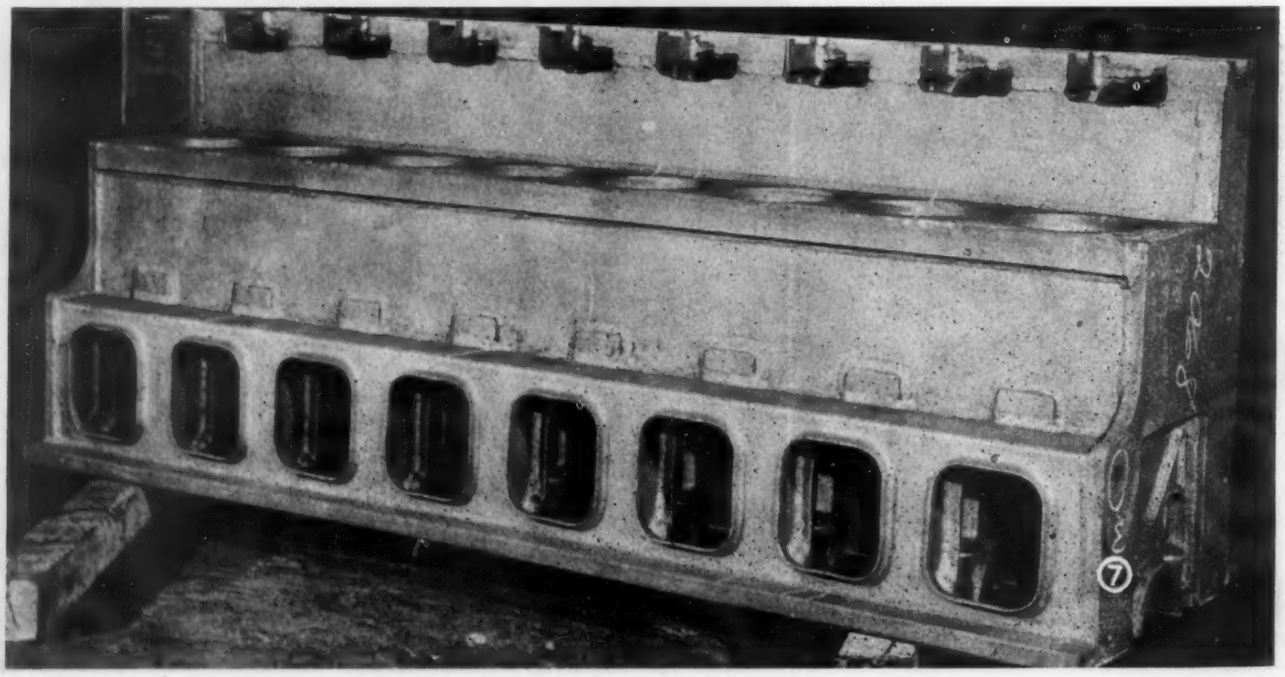
All these factors involving predictability in the trend of weldment use have only economic significance.

A factor of engineering significance is consistent predictability required by severe operating conditions. This high speed blower fan, Fig. 6, is composed of a central forging with drop forged vanes welded to it. These fans which operate at 5000 revolutions per minute, and are tested at 7500, have been used for several years prior to the war.

Obviously the inherent soundness of the forged and welded steel is considered insurance against failure which would be very serious at the speeds indicated.

Comparative Strength Characteristics: The third reason behind trends being discussed is comparative strength char-

Fig. 7—Welded frame for 8-cylinder diesel auxiliary on shipboard. Unit is almost 7 feet long, 3 feet wide, 2 feet high; weighs 2065 pounds



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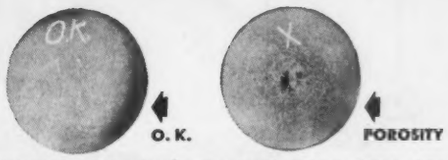

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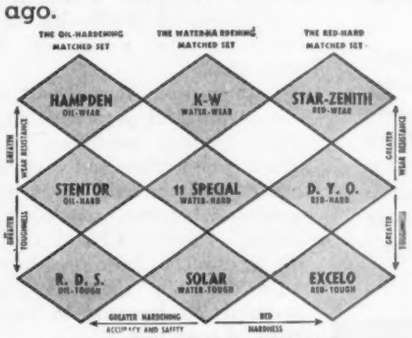

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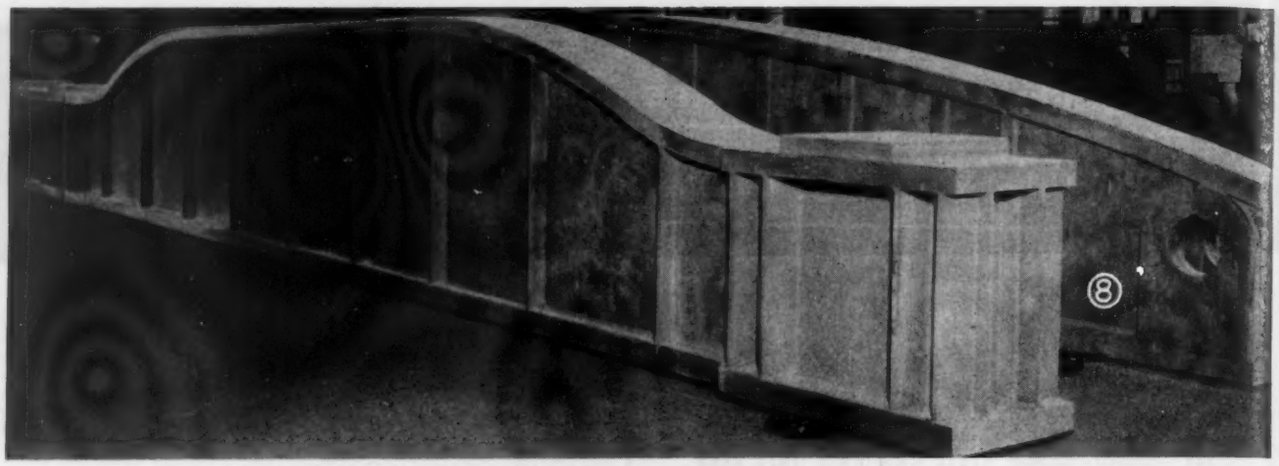


Fig. 8—Top and bottom girders for construction of strongback bending roll. Bottom girder in foreground is approximately 50 feet long, 6 feet high, 2½ feet wide; weighs 57,980 pounds. Top girder in background is about 40 feet long, 6 feet high, 2½ feet wide; weighs 56,480 pounds

acteristics of other competing materials.

Fig. 4 shows the end portion of a rotary mixing unit, many of which are in operation in a chemical process. The original design used steel castings and properly so, for at that time weldments as machinery parts did not warrant consideration since too little was known about their design. The castings failed consecutively following a limited service life. Repairs were attempted unsuccessfully so that replacement became a somewhat normal procedure. The difficulties of shape and size limitations apparently were such that a steel casting of designed strength was not possible.

Finally, attempting to eliminate constant replacement, the user considered a weldment. The piece shown is the result which has now become standard in this application. The original installation has been in service for over five years and no replacements have been necessary. No change in the mechanical design was needed; the weldment simply replaces the casting within the size and clearance limitations imposed.

A substantial part of the welded structure remains a steel casting. Castings were used in the design where economical, as well as to obtain flowing contour inherent in a casting at points where such is desirable.

We have here a profound difference in the concept of applying castings. The castings used in this part are of such size and shape as to be desirable and readily produced in the foundry. This is in contrast to the difficult production features of the entire piece as a single casting.

Two things are apparent: First, steel plate has been substituted in the large flat expanses involved and secondly, the concept of welding has permitted the elimination of the fundamentally weak points. The piece is broken into small components of predictable strength; integrated with welds of predictable strength.

In such a mechanical part, a comparison of physical properties applicable to static loading conditions is not adequate. Repetitive and reversed loading occurs, and the endurance limit of the structure becomes the controlling criterion. There is a trend toward making the endurance limit and impact resistance definitely specified properties of materials to be used in the structural parts of machines.

Much has yet to be established by research, regarding such properties. Our knowledge regarding phenomena resulting from multi-axial stresses is limited also. However, the progressive accumulation of such knowledge will promote meticulous care in design and production so that present day castings or weldments will seem crude in shape and quality by comparison.

Maximum Rigidity Considered: Our fourth reason behind the trends in the use of weldments is maximum rigidity and this must be considered within definite weight and space limitations to be discussed clearly.

Maximum rigidity so limited, obviously can be realized only by disposing material with the highest possible modulus of elasticity in the most effective man-

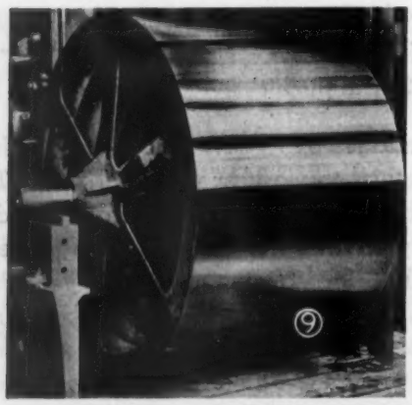
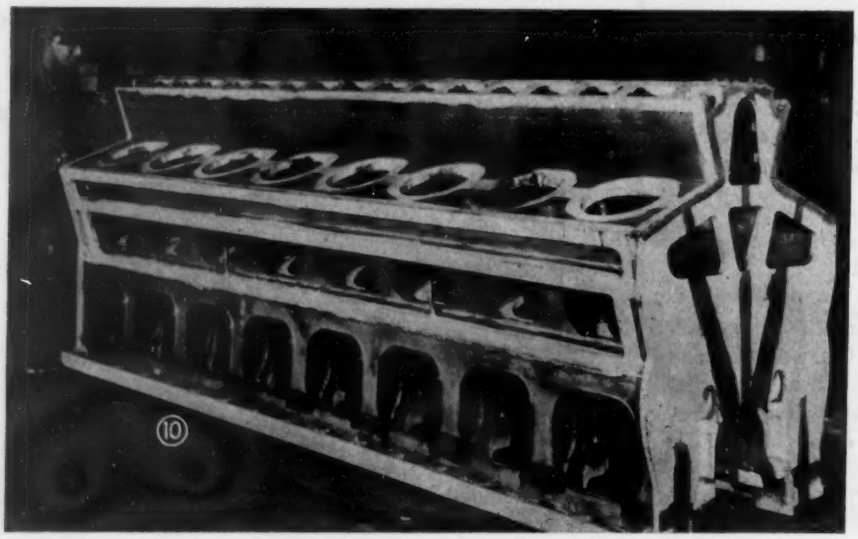


Fig. 9—This double-shell welded steel dryer cylinder operates at 100 p.s.i. instead of former 20 p.s.i.; also reduces steam consumption 40 per cent. Unit is 5 feet outside diameter, has 4-foot face, weighs 4665 pounds

Fig. 10—Crankcase frame of welded construction for 16-cylinder diesel. A submarine traveled several thousand miles on one of these engines even with a multitude of cracks in the frame This unit is approximately 11½ feet long, 3 feet wide, 4 feet high; weighs about 8800 pounds



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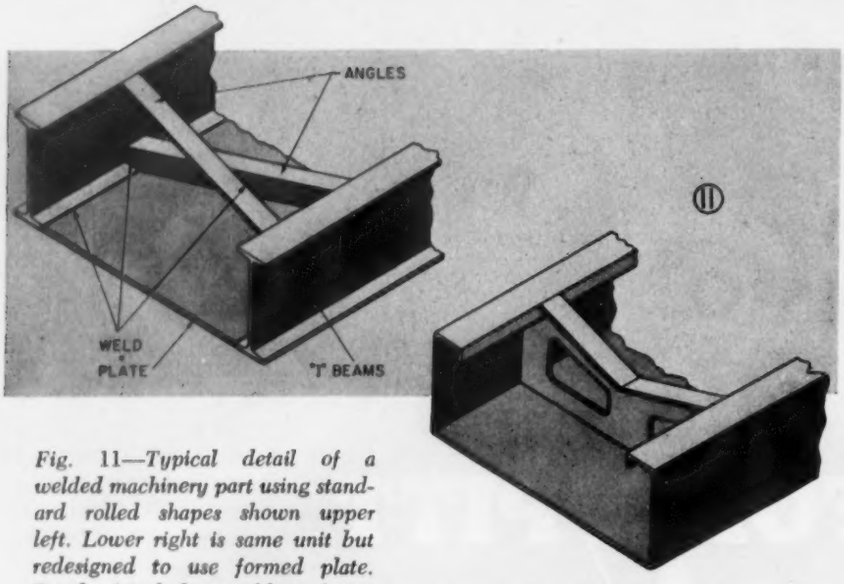


Fig. 11—Typical detail of a welded machinery part using standard rolled shapes shown upper left. Lower right is same unit but redesigned to use formed plate. Result: Much less welding, lower cost, more effective design

ner. Simply put, there is no question that an iron casting is more rigid if it weighs enough or is sufficiently larger in cross section.

The foregoing remarks may seem elementary, but they are made because the repeated assertion in the early days of welded steel, that cast iron is stiffer, is still heard occasionally.

Weight Reduction: Our fifth reason in the selection of a structural part is weight reduction. This has established to a great degree the trend in the use of weldments. Weight is a watchword in transportation equipment with current emphasis on increased speed, safety and operating efficiency.

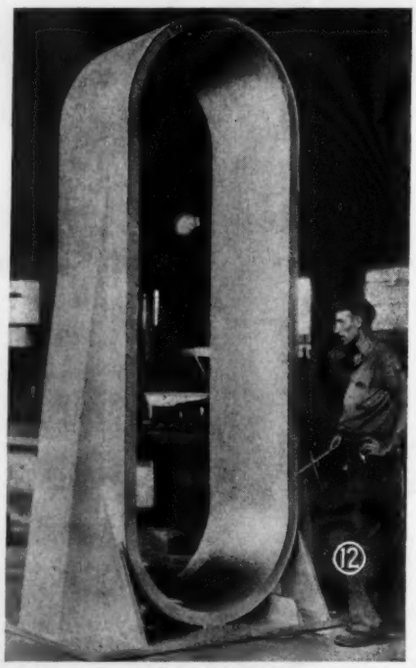
The gear blank, Fig. 3, came into being in the search for minimum weight of marine drives on naval vessels in the days when "treaty limits" were the design basis for our Navy's ships. Such items replace castings of relatively enormous weight.

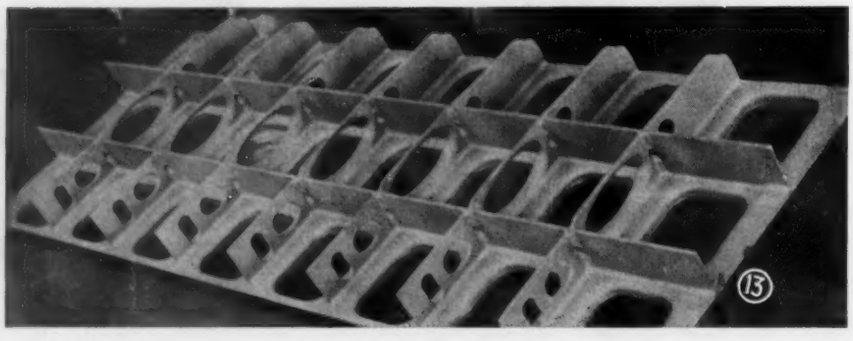
Apparently they show marked superiority in resisting the abnormal loads imposed by the explosive forces of battle damage, but they are used extensively in cargo vessels also.

Weight reduction dictates the engineering selection of construction for this diesel engine frame, Fig. 7. This frame is more complicated than it appears. Much of it is composed of metal 3/16-inch thick, and such thin sections throughout its structure connect with much heavier sections in a somewhat abrupt manner. There are labyrinths in its shape involving many small enclosed pockets. Clearly it would be difficult, if not impossible, to use any other known form of construction with less weight.

Thousands of these frames have been produced without question of predictability or design hazard. They are neither scrapped in production nor are they replaced due to service failure.

Wearability: The sixth point in the use of weldments is typified by the part pictured in Fig. 1. It is a plate 8 inches thick, 23 inches wide, and weighing 12 tons formed in the bending rolls to a 12-foot circle and butt welded. After finishing, these weldments are used as "riding rings" on rotary kilns. Wear naturally controls their service life, but they do not wear out as quickly as those previously used.





Increased Operating Efficiency: Our seventh reason is increased operating efficiency of the machine in which the parts are used. The dryer roll, shown in Fig. 9, is an important advance in the use of welded machinery parts. It is a steam heated dryer used in the paper, printing, drug, and textile industries. Traditionally of cast iron, at least 250 welded steel dryers are now in use, some of them for more than 10 years. They are lighter in weight than castings, but this is not usually a prime consideration. In one application steam consumption was reduced approximately 40 per cent, and yet production was increased. The thickness of the outer shell on the dryer shown is approximately ½ inch. The dryer operates under a steam pressure of 100 pounds. The replaced iron dryer, with much thicker shell, carried 20 pounds of steam.

Natural Adaptability: The final item establishing trends is natural adaptability—that is the suitability of a welded structure to design requirements. In the foreground of Fig. 8 is a typical example of a beam weighing approximately 30 tons. Roughly it is 50 feet long and 6 feet high with flanges 5 inches thick and web plates ⅞-inch thick.

It seems obvious that this form of construction is most suitable for parts of this nature. Clearly, riveted construction would not be more adaptable or economical. It is not likely that castings in either steel or iron would be more economical. It is used in a huge bending roll for forming large heavy plates.

Basic Fundamental Is Engineering

Certain engineering fundamentals underlie the use of any type of construction or material. The basic fundamental behind the trends in the use of weldments is the engineering utilization of rolled steel.

Field welding, or structural repair, must be taken into account in the selection of steel. Perhaps design loads are based on physicals dependent on special heat treatment. It is practically impossible to so treat the weldment in the field. Possibly the steel is not weldable at low temperature. Ordinarily these can be said to be considerations of little importance. They do apply in the selection of materials, for instance, in

(*Please turn to Page* 160)

Fig. 12—Two pieces of heavy plate, formed into U's and with ends buttwelded, make up frame for powerful hydraulic press

Fig. 13—Typical subassembly with all welding completed yet accessible for inspection

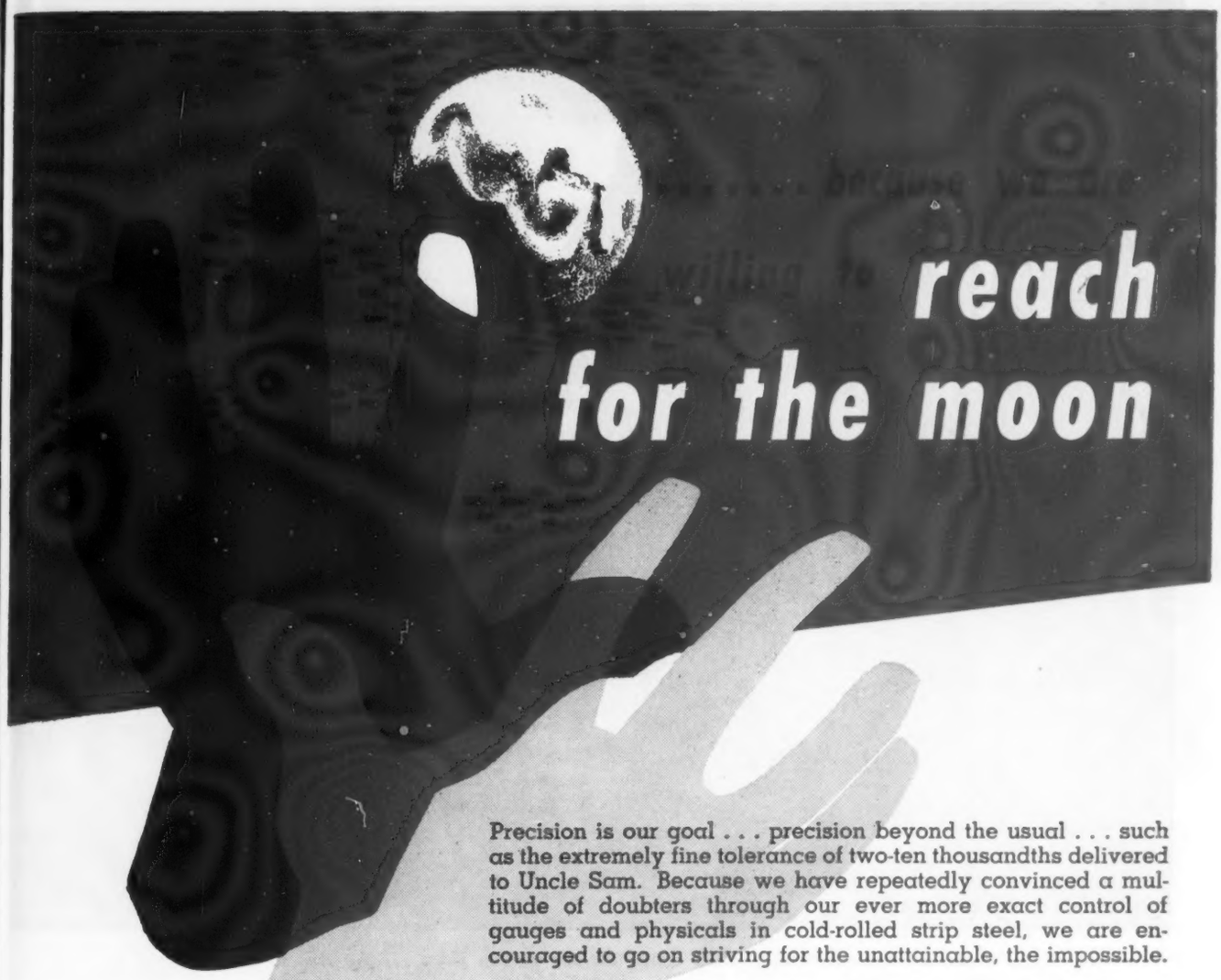


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Fig. 1 (Above)—Here the bottles containing the radium paint can be seen to glow from their own radioactivity

More industrial applications seen as price drops from $5,000,000 to $1,000,000 per ounce

IMPORTANT expansion of industrial uses of radium is expected to follow tne recent 80 per cent reduction in price from $5,000,000 to $1,000,000 per ounce. Now it costs only $25 for enough radium to paint several dozen aircraft instrument dials instead of $125, thus greatly increasing the field of usefulness of this "everlasting" luminous paint.

That price of a million dollars an ounce is not as expensive as it sounds for a little radium goes a long, long way. The operator in Fig. 3 is holding a 10-gram bottle (an ounce contains roughly 30 grams). In the bottom of the bottle is one gram of radium compound which contains 1/10,000 of a gram of radium—just about enough pure radium to cover a pin head.

Yet when this gram of compound is mixed with a liquid binder, it will be sufficient to provide a never-failing luminous glow on several dozen aircraft dials at a total cost of about $25.

Increased production of radium in recent years has reduced its price four million dollars per ounce. Thus it will be available for many postwar products at a comparatively nominal cost.

But let's look at why and how it is used in aircraft . . .

War is the most destructive force known today. Yet, it is the greatest accelerator of scientific development and scientific knowledge. The extreme urgency of military requirements necessitates constant and continuous improvements in death-dealing and protective instruments to facilitate progress in keeping ahead of the enemy and to assure ultimate victory.

Military objectives, once carried out in total daylight are now sought and overcome in the pitch blackness of night operations. The greatest and most spectacular advances in night operations have been made in the operations of night flying planes. Little thought is normally given by the casual reader of night bombing missions as to how the crews of planes are able to operate the intricate instruments of combat and navigation in total darkness. In the cabin of a modern military plane are hundreds of dials, gages, handles, knobs and controls which must be operated continually to enable the crew to proceed to accomplish its mission and return to its base without revealing their position to ground or flying enemies.

The present high success of these missions has largely been made possible by one of the most rare and romantic elements known, radium. Today, in all planes the control compartment consists of a maze of instruments all of which are coated with a material known as self-luminous or radioactive-luminous compound. The history of the use of this compound dating back to the last war has been a story of heroic development in spite of death and permanent injury to hundreds of people who came in contact with this material. The records show that several hundred people were killed through various types of radium poisoning or exposure prior to 1930. Since then, the handling and application of radioactive compounds has been greatly improved. Now, due to the sacrifices of these people, if proper precautions are taken, there need never be any more injuries or deaths due to exposure to ra-

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Fig. 2 (Above)—Processing room contains every safety provision — exhaust ducts, glass table tops, spotless quarters, etc.

Fig. 3 (Right) — Worker holds a 10-gram bottle which has a single gram of radium compound at the bottom. This contains only 1/10,000th gram of radium, about enough to cover a pin head, yet it will make enough radium paint when diluted to mark several dozen aircraft dials

dium and similar materials in industry.

The application of radioactive luminous compound is carried on in Cleveland at the laboratories of the Lustrolite Cleveland Corp. Radium hazards are principally three in number: Due to the atomic disintegration of the element, radium passes through several decay products, through various stages in its course of decay from its parent, uranium to its ultimate, the stable compound, lead. All of these up to lead emit penetrating and destructive alpha, beta, and gamma rays. The rate of emission is entirely unaffected by chemical combination or by temperature, pressure or other physical conditions. All salts of radium have the same toxicity as the elemental radium which they contain.

The three principal hazards, therefore, stem from the bombardment of parts of the body exposed to radium in one form or another. The decay products of radium, actually three times as destructive as the radium itself, are principally radon gas, Radium A and Radium C′. Radium after losing the alpha particle, becomes an inert gas, the heaviest of the noble gases, helium, neon, krypton, argon, xenon and radon.

After the radium decays to radon, it further decays through Radium A and Radium C′, each of which emit large quantities of alpha, beta and gamma rays, in varying quantities. Inhalation of radon results in the ultimate deposit of Radium A and C′ in the body, which cannot be removed by any known medical or chemical process, due to its position in the electromotive series. It therefore continues to destroy body tissues through bombardment.

A second hazard is the ingestion of the actual radium element through contact with the hands in application of the material to parts being processed. Operators have been known to get very small particles on their fingers, touch food or cigarettes, thereby transferring the material to the mouth resulting in radium being absorbed through the digestive system. Also, carelessness in handling the dry compound when mixing it for use has resulted in inhalation of the dust, resulting in its deposit in the lungs.

The third hazard is the exposure to large amounts of radium causing operators to receive large doses of gamma rays emitted from the stored compound ready for application or from completed parts waiting to be assembled on instruments.

In order to protect operators from these hazards, methods have been developed through research conducted by the United States Bureau of Standards and the Massachusetts Institute of Technology and others. In order to protect the operators from inhalation of radon gas and dust from mixing the compound, two types of hoods have been designed, an open type drawing 100 cubic feet of air or more per minute across the operator's table and a closed type drawing 50 cubic feet of air away from the operator.

Protection from the second hazard is accomplished through immaculate housekeeping by the operator. Each operator must wear a smock or apron while working with radium, which is worn over street clothes or in place of them, and never taken from the working area, except for laundering. Operators must apply a cream to their hands before working which forms a "second skin" which washes off with soap and water, carrying with it any compound which may adhere to the fingers or hands. After washing, hands are inspected in a dark room under exposure to a "black light", emitting ultra violet light through a filter which screens out visible light, thereby causing microscopic particles, otherwise invisible to the naked eye to fluoresce brightly. If any particles still remain, the hands are then scrubbed with various solvents to remove any remaining particles.

Table tops where radioactive compounds are applied are covered with plate glass, impervious to any solvents in the adhesive or thinner in the prepared compound so that any spilled particles can be cleaned off. Floors are heavily waxed, linoleum and walls are pointed with a high gloss enamel to facilitate easy cleaning. No sweeping is permitted in the radium laboratory which

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would result in dispersal in the air of dust containing radium compound falling in the form of microscopic chips from finished parts or from compound which may have been spilled on the operator's clothing or hands, dried, and dropped off.

No unnecessary objects are permitted in the laboratory and the entire place is kept immaculately clean by frequent washing with soap and water and various solvents as may be required.

Periodic inspections of the premises are made with all lights turned off by carrying a "black" light to reveal any particles of compound which may be deposited on the floors, walls or furniture. All finished parts are kept in ventilated storage compartments after having been dried in a ventilated oven to remove radon.

The third hazard, exposure to high concentrations of gamma rays, is provided principally by keeping large quantities of finished parts at a sufficient distance away from any working places, since the exposure is inversely proportional to the cube of the distance from the source of the emissions. Protection can also be provided by lead shielding, but since the amount of radium compound is relatively low in comparison to the amount in therapeutic applicators, the use of lead shielding is not generally necessary.

In order to further protect radium dial painters, periodic health examinations are made by a licensed physician. Premises are periodically inspected by a radiologist with radium detection instruments. In the case of Lustrolite Cleveland Corp. this is done by Dr. Otto Glasser, Ph. D., head of the Department of Biophysics, Cleveland Clinic Foundation. Once every three or four months an expired air sample is taken from each operator and sent to the U. S. Bureau of Standards at Washington, and tests made on it to determine the radio-activity of the air. Also, a workroom sample is likewise periodically tested.

Since the emission of radon from a given amount of radium is a physical constant, the amount of radium in the body can be accurately determined from the amount of radon in the expired air of the subject. In the past, the tolerance dose of radium has been reduced from 10 micrograms, then 1 microgram and now it is 0.1-microgram. With the development of more sensitive instruments in the past few years, an amount as low as 0.1-microgram in the system of an individual can be detected.

Activity of 10-12 curie per liter of expired air is an indication of 0.0000001-gram (0.1 microgram) of deposited radium. No known case on record has shown any injury to persons having a radium burden of from 0.01 to 1.0 microgram of radium from periods of 10 to 25 years, so it may be assumed that a tolerance dose of 0.1-microgram is a safe standard.

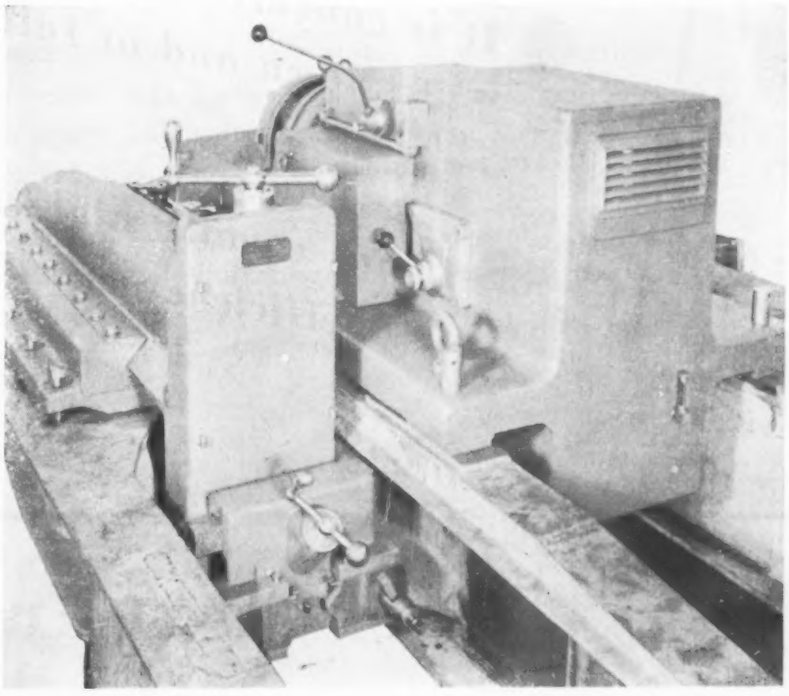
Health Guarded Carefully

After any operator has shown an amount of injected radium in excess of this amount, he is immediately given a vacation, or placed in other work such as undercoating, application of fluorescent compounds not containing radium. From past experience from 2 to 35 per cent of radium taken by mouth remains in the system more than 5 days. Most operators lose from 50 to 90 per cent of ingested radium in periods ranging from one to three months depending on the constitution of the individual.

In the last war radium compound used was nearly all of a type known as "38M" which indicated a self-luminous brightness of 38 micro-lamberts after being in total darkness not less than 8 hours. All radioactive luminous compounds have a much greater brightness when eexcited under ultraviolet and have what is called a "lag". That is, after exposure to light, they gradually become dimmer until the only emission of light is the result of the bombardment of the luminous compound by the alpha rays of the radium in it. This lag caused a certain difficulty in night planes due to the fact that after black light sources in planes were shielded, the instruments on the dash continued to glow a bright green, reflecting in the faces of the crew and the interior of the cabin, thereby revealing their position to night fighter planes attacking them.

After considerable research, the Air Corps developed a compound known as 14112 which specifies that the compound shall lose 90 per cent intensity of the emitted light in 0.5-second and has a self-luminous brightness of 1.2 micro-lamberts. This intensity, although sufficiently bright for pilots to see their instruments, is so slight that it is necessary for a person to remain in total darkness 5 to 15 minutes before the light is visible to the eye.

The one particular disadvantage in the use of this compound, however, is that it contains 2½ times as much radium as the former 38M and is consequently that much more dangerous to handle, requiring greater care and more accurate inspection of operators and premises to prevent injury. However, the new recommendations for handling the compound and the more sensitive instruments now available for detecting the presence of ingested radium make the handling of this compound even more safe than procedures used 25 years ago with the 38M compound.



MACHINES GUN MOUNT: Special hydraulic shaper built by Rockford Machine Tool Co., Rockford, Ill., now is used for machining welded steel gun mount base, replacing large openside planer on the job. The shaper is designed to fit into openings between main beams of base, and may be carried to and from each job by crane and hoist, three eyebolts being provided in tool's frame for lifting. It machines recess in gun mount base approximately 12 x 12 feet by 6 inches deep and large flat pad on the inside of the opposite I section. Controls may be set for finishing to close tolerances. Locating pin for guidance and two locating pads fitting into grooves in weldment position the shaper. Heavy hold-down bolts fasten it securely to the work

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IN BRIEF

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2. *It operates equally well on either gas or oil fuel!*

3. *It is convertible without shutting down and at full load!*

4. *It has equally high diesel thermal efficiency on either fuel!*

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l Development in Years!

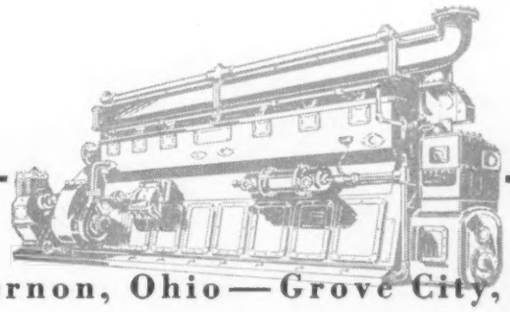
EVER since 1928, Cooper-Bessemer has been experimenting to perfect a means of using gas as a practical diesel fuel and to permit instantaneous change-over from fuel oil to gas and vice versa. It can now be announced that these efforts have been completely successful — a truly revolutionary accomplishment.

Without exception, all of the advantages inherent in full diesel operation are retained. In fact there has been no modification whatever of the characteristic diesel principles. Thus the fairly common 35 per cent thermal efficiency of the conventional oil-burning diesel is just as readily reached when burning gas — a full 30 per cent increase in thermal efficiency over the best gas engines of the electrical ignition type.

An important factor in this new development is the admission of gas at normal pressure, assuring customary diesel reliability, avoidance of complications, and low maintenance.

Of extreme significance in many services, instantaneous convertibility from one fuel to the other is in itself an outstanding accomplishment. It is as simple as opening one valve and closing another while the engine is running at full load.

Engineers and operating officials in many fields will instantly recognize the tremendous economies and advantages made possible by this new Cooper-Bessemer development.



Corporation Mount Vernon, Ohio — Grove City, Pa.

COMPLETES TEST RUN ON

Mullite Open Hearth Roof

By C. W. FYFE*
General Manager
Mullite Refractories Co.
Shelton, Conn.

Construction employed for laying up furnace roof of this type refractory at an Ohio shop results in pinching and eventually spalling from the knuckle to the endwall. Since installation of new center section little or no erosion has occurred. Future plans call for fully-suspended center section from knuckle to knuckle. Today mullite is used in many types of furnaces in the steel industry

WHILE the initial installation of a mullite roof in an open-hearth furnace has proven most valuable, it has not given the results anticipated. The life of the center section of the roof was shortened due to mechanical failure rather than the properties of mullite. Although there is only one installation in an open-hearth roof, several have been made in end and frontwalls. Some have not been too encouraging; others are showing considerable promise. Some failures have been due to outside causes.

The method by which this roof was constructed established a pinching effect which was impossible to arrest during the campaign. Under ordinary circumstances, mullite does not spall and when a pinching effect is encountered it is generally due to mechanics of construction.

From present indications, the spalling in the roof from knuckle to endwall in this initial installation has stopped, and observation indicates there has been little erosion or eating back since the new center section was installed. If this condition continues, this mullite end section of the roof from knuckle to endwall may stand up during the life of several center sections. Pinching in future installations will be eliminated.

Preparations are being made to install a fully suspended center section from knuckle to knuckle, which type of construction should also eliminate any pinching, and since there is no reason for spalling this installation could develop the desired results.

The steel industry has been experimenting with other refractory roofs, but up to this time no satisfactory answer has been found relative to the roof life desired. Information obtained from a few additional installations perhaps will prove the worth of mullite for open-hearth roof construction.

A satisfactory refractory for this application will mean increased operating temperatures, lower fuel consumption and less shutdowns for repairs. Mullite (71.8 per cent alumina, 28.2 per cent silica), because it has the ideal softening point for the operating temperature of an open hearth, bears promise of obtaining the desired results. At 3000 degrees Fahr. with a 50 pound per square inch load (which is twice the load required in the A.S.T.M. test) mullite shows less than 2 per cent deformation. It is the only stable refractory at 3000 degrees Fahr. and has always had ample load bearing capacity for the construction of any wall operated at accepted commercial temperatures.

No spalling occurs in a mullite brick, nor are oxide penetrations experienced. The A.S.T.M. test shows no spalling and in plant laboratory test carried to 73 cycles brick shows no mechanical defects.

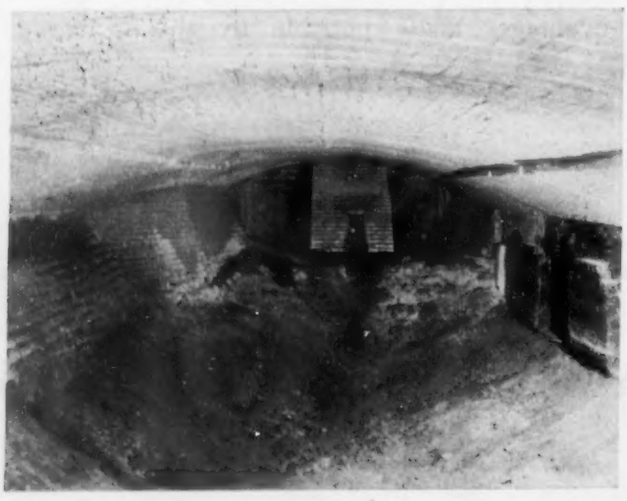
Precautions should be taken when setting up mullite brick to see that no magnesite brick or cement are in contact with the material inasmuch as magnesite and mullite flux each other. Silica drip also is detrimental to mullite as it is to other refractory materials.

Two failures in frontwalls were caused by contact with magnesite. In one case, alternate courses were laid up with magnesite; in the other case, the frontwall

(*Please turn to Page* 164)

*From an address presented at the joint meeting of the Ohio section, National Open-Hearth Committee and the Ohio Valley Section, A.I.M.E., Columbus, O.

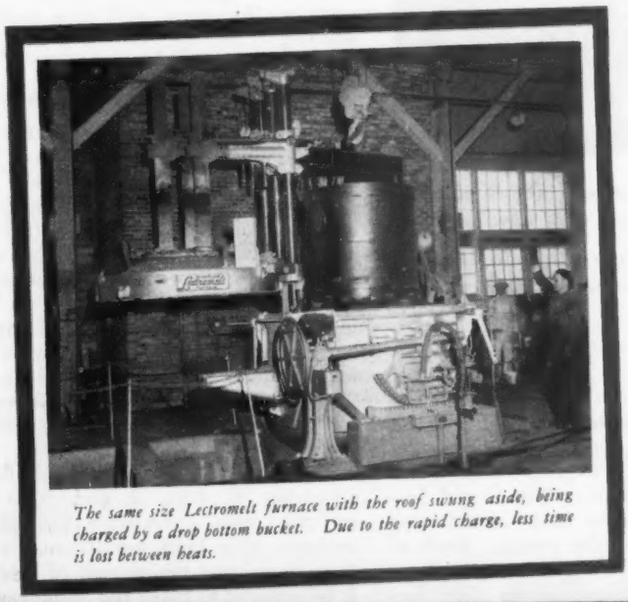
Interior view of open-hearth furnace showing roof laid up with mullite refractory



Charging side of open hearth showing ribbed sections of mullite roof

Outstanding IN FOUNDRY MELTING

Lectromelts have been prominent in foundry operations for more than twenty-five years. Today, there are more Lectromelt furnaces engaged in the melting of quality steels and irons than any other type of electric furnace.



The same size Lectromelt furnace with the roof swung aside, being charged by a drop bottom bucket. Due to the rapid charge, less time is lost between heats.

We are the largest exclusive manufacturer of electric furnaces in the world. Our skilled engineers and metallurgists have devoted their time and efforts to the development of the simplified design and exclusive operating features which have given Lectromelt an enviable reputation throughout the world. The best in mechanical and electrical design have been successfully coordinated to assure dependable operation with a minimum of maintenance.

Lectromelt furnaces are available in both the door and top-charge types in capacities ranging from 100 tons down to 25 pounds. We will forward detailed information on request without obligation on your part.

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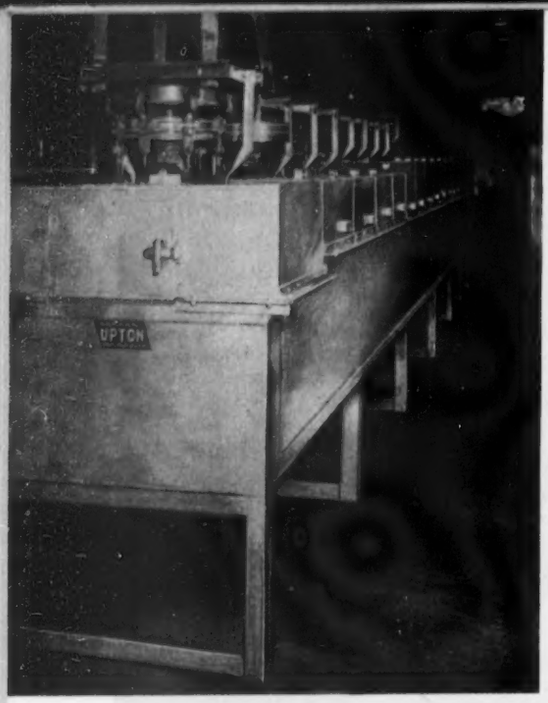


Bright ANNEALING BRASS

Longest continuous conveyor-type salt bath furnaces full anneal 6000 pounds of brass cartridge cases per hour with unequalled absence of oxidation

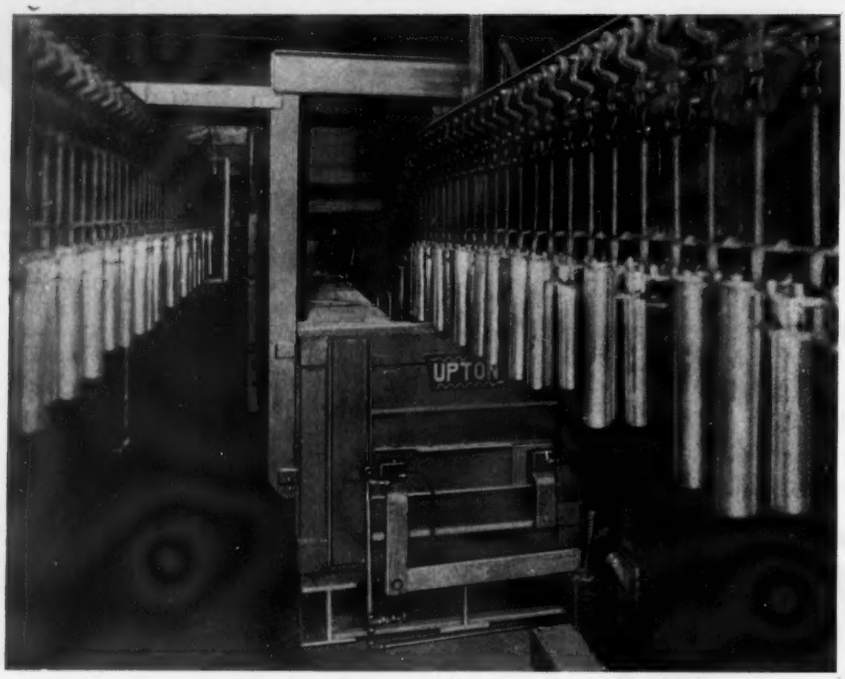


Fig. 1 (Above left)—First installation of continuous furnace in this plant. The two new units replace 10 individual non-continuous duty furnaces

Fig. 2 (Above)—Bright and fully annealed cartridge cases suspended from conveyor emerge from continuous salt bath furnace with capacity of 6000 pounds per hour

FULL anneal of brass cartridge cases on a continuous production heat treating basis is being accomplished in a Detroit plant with what are described as the longest continuous conveyor-type salt bath furnaces in the nation, and with unequalled absence of oxidation.

In addition to the expected reduction in costs of operation, plus the increase in speed, a striking feature of the operation is that the anneal on brass is not only a full anneal but a bright anneal as well. As a result, pickling or other cleaning is not required following the anneal.

Two furnaces are employed, each one capable of annealing 6000 pounds of brass per hour. One gives the cases a full anneal at 980 degrees Fahr. before the nosing operation. The second furnace full anneals the cases, at the same temperature, after the nosing. Each of the two Upton-built furnaces replaces 10 individual noncontinuous duty furnaces.

Cases from the previous operation are lowered into the molten salt at one end of the furnace pot and are moved through the salt at a rate of 60 feet per minute. After traversing the entire length of the pot, a turn-around area at the end permits the conveyor to bring the cases back through the pot for the additional time required for full anneal. Conveyor is arranged so that the cases remain in the bath the required time, yet in such a way that drag-out of salt is kept at a minimum.

With the exception of the occasional shovel full of salt needed to replenish salt lost through normal operation and from the nominal drag-out, the operation is not only continuous, but is entirely automatic. Temperature of the bath is held within plus or minus 5 degrees Fahr. by automatic electric temperature control.

Moreover, should the temperature vary more than that predetermined amount, a horn installed on the temperature control panel and audible through most of the plant will give sufficient warning. In this instance, the horn never has sounded.

Furnace Has Removable Covers

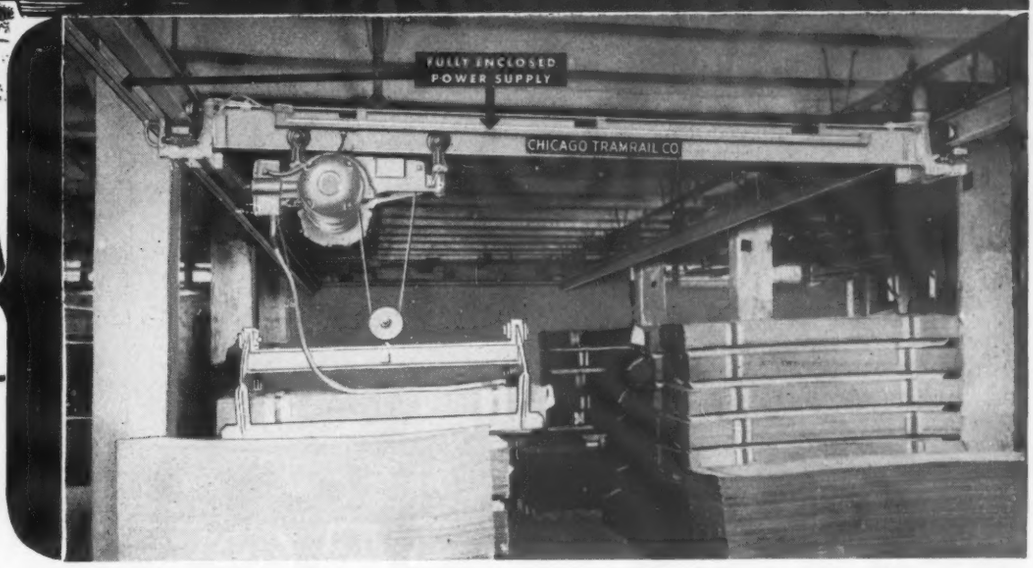
The furnace first installed for this work—shown in Fig. 1—has been equipped with removable covers with the idea that sufficient heat would be radiated from the salt to make their use advisable. Salt is added through a small door in the covers at the turn-around end of the furnace. This unit has been in continuous operation for 18 months and has been shut down only twice during that time for cleaning, whereas previous equipment required shut-down for complete cleaning every week without exception.

The second furnace to be installed—appearing in Figs. 2 and 3—is not equipped with covers since, through experience with both installations, it has been found that the amount of heat lost is so small as to make the additional expense unwarranted. This second furnace is placed on the floor, in contrast to the first (enclosed) unit which has its base approximately 3 feet off the floor.

Uniform temperature throughout the bath is made possible largely by the

Stack up BIG $AVINGS Handling STEEL STORAGE

FASTER SAFER *at less cost!*

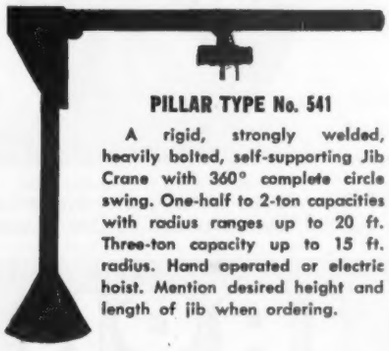


Unit shown is a single motor, Chicago Tramrail Underhung Crane with push-type trolley, electric hoist and Sheet-Grab. Also available in 2 and 3 motor types for automatic operation of longitudinal, lateral and vertical motions of crane.

Photo Courtesy M. Block & Sons, Chicago, Ill.

The savings accomplished by the installation of Chicago Tramrail Overhead Cranes in your steel storage rooms are not theoretical. They are real dollars and cents savings that show up prominently on your cost sheet. The above photograph shows a small, hand-operated overhead crane with sheet-grab handling sheet steel in bundles. It illustrates a few of the ways in which you save.

You *save* on installation costs—one crane does the job of many because it can operate throughout the room, the hoist being shifted from one bay to another at various transfer points along the runways. You *save* on labor: These easily operated cranes release large crews for other work. You *save* on accident costs—the fully enclosed conductors are a real safety feature where men are working on top of the bundles close to the hoist. You *save* space—the steel bundles in the photograph above are stacked more than 6½ ft. high in a ten-foot ceiling room.



PILLAR TYPE No. 541

A rigid, strongly welded, heavily bolted, self-supporting Jib Crane with 360° complete circle swing. One-half to 2-ton capacities with radius ranges up to 20 ft. Three-ton capacity up to 15 ft. radius. Hand operated or electric hoist. Mention desired height and length of jib when ordering.

We urge you—install Chicago Tramrail Overhead Cranes in your steel storage rooms without delay. Discover how the correct type of crane can save labor, reduce costs and speed up safer handling of steel in storage and elsewhere in your plant.

Write—ask us to submit specific recommendations. No obligation.

CHICAGO TRAMRAIL COMPANY

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Matte Ladle for Smelter. Weight, complete as shown, approximately 29,000 pounds.

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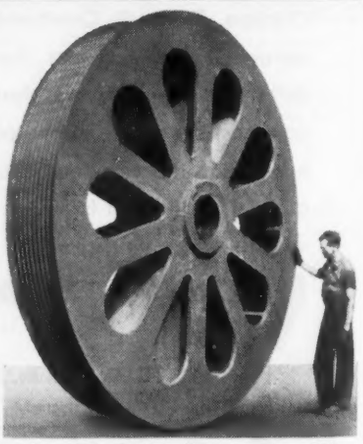
OPERATED primarily to produce the wide variety of carbon- and alloy-steel castings required in the manufacture of Vulcan Locomotives, Hoists, Rotary Kilns, etc., our large Steel Foundry also serves many other manufacturers and users of heavy machinery. The fact that we are able to produce unit steel castings up to 38000 pounds net weight, and machine them in our own shops, permits meeting requirements beyond the limits of most foundries and has enabled us to build up a very high-class clientele.

Facilities include an extensive pattern-making department, with fireproof storage space for more than 50,000 patterns. We also provide any desired degree of engineering and machine-shop service—including the manufacture of complete special machinery to purchasers' designs and specifications.

Inquiries for heavy carbon- or alloy-steel castings are cordially invited and will receive the personal attention of highly experienced engineers and sales executives.



Counter-weight Sheave for Lift Span of Railroad Bridge. Weight, approximately 26,500 pounds.

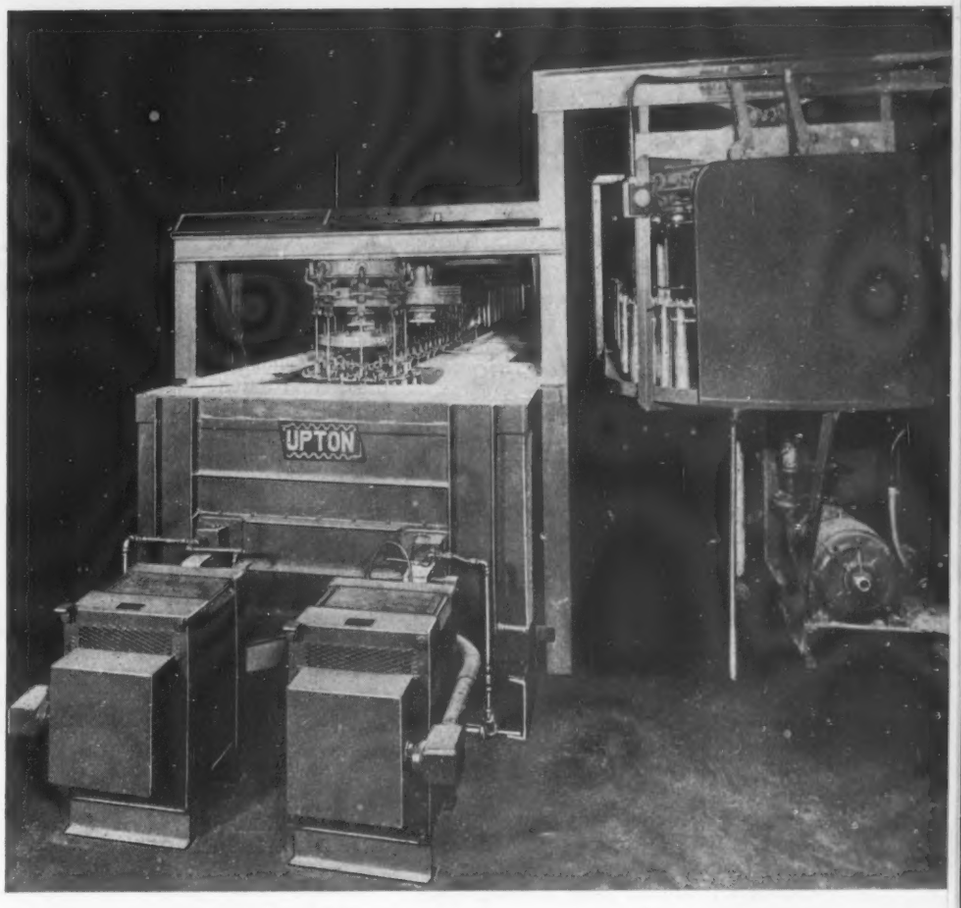
Established 1849

VULCAN IRON WORKS

WILKES-BARRE, PENNA., U.S.A.

New York Office 50 Church St.

Fig. 3 (Right)—End view of coverless furnace in Fig. 1 showing offset for turn-around



placement of electrodes which enter the sides of the furnace instead of being thrust in from above the surface of the salt. These electrodes, which conduct current into the bath from transformers located outside, are so positioned that transfer of current through the salt generates heat at the bottom of the pot rather than anywhere above that point. The result is that a normal flow of heated salt circulates upward in response to natural laws of physics, thereby evenly heating the entire contents. Electrodes of this type, which are not exposed to the combined action of salt and oxygen, appear to be capable of lasting indefinitely. In the 18 months of continuous operation, no replacements have been made.

An additional advantage claimed for this electrode design, used in conjunction with the full ceramic pot, is that it permits use of ordinary commercial nitrate salts, further reducing heat treating costs. Of added interest is the fact only 20 per cent of the volume of salt used previously by individual furnaces in this plant now is provided for operation of the continuous bright anneal installations.

Metals Recovered by Resin Process

A new process for recovering valuable and war essential metals was announced by chemists of Permutit Co., New York, at the American Chemical Society's 11th annual chemical engineering symposium at Columbia University. Dr. Sidney Sussman disclosed details of the process, developed in conjunction with Dr. Frederick C. Nachod and William Wood.

Chromium, vanadium, molybdenum, gold, platinum, palladium, and other metals may be removed from waste solutions by absorption on anion exchange resins under special conditions. New method introduces a new application for anion exchange resins, members of the plastics family which are widely used in one step of a heatless method for low cost production of distilled water.

Primarily intended for recovery of scarce and valuable metals now being lost in waste waters, the new method also is expected to be helpful in reducing stream and harbor pollution in the vicinity of electroplating and other metalworking plants.

According to the authors, under special conditions anion exchange resins will completely absorb certain metal salts from very dilute solutions. When complete absorption is no longer obtained, the resins are treated with appropriate chemical solutions to effect recovery of metals in form of solutions which may be 25 or 30 times as concentrated as original waste liquors. Anion exchange resins are claimed to undergo no permanent change in process and may be reused indefinitely.

In contrast to many previously proposed processes for recovery of metals of this group, the new anion exchange process provides recovered metal in the form of a salt which may be used directly in plating or other processes.

Because of their high prices, the precious metals, such as gold, platinum, and palladium, may be recovered economically by a simpler alternate process of burning the anion exchange resin after saturation with the metal. Because anion exchange resins are almost entirely free from ash-forming impurities, residue from this process consists of practically pure metal.

Illuminated Glass Plate Checks Tool Angles

An illuminated ground glass inspection plate has been devised at General Electric's Pittsfield works as a simple quick means of checking angles on tools or matched cutters. Glass is set in a wooden frame at an angle of approximately 65 degrees. The light source under the plate is a standard 100-watt lamp.

Tool being checked is placed on the plate, and protractor or template is placed against the side of the tool. Any error is said to be immediately discernible. This method also is said to provide a positive check against the true cutting edge of the tool, which is not always possible when protractor is held in one hand and tool in the other.

This inspection plate is inexpensive and simple to make, and can be replaced easily if broken, according to the company. It can be used by inexperienced persons, and is adaptable to many inspection jobs.

Heavy Duty Tool Tips Aid Machining

A line of tools with clamped-in and advanceable tips for heavy duty machining on steel castings, forgings, bar stock and cast iron is made possible by the development of heavy duty tips. Overhanging the tool shank by about 1/16-inch, the tips have ample strength to take heavy feeds and depths of cut.

The tip used in these heavy duty tools, made by Kennametal Inc., Latrobe, Pa., has a clamping shelf along the top of the side opposite the cutting edge and is diamond ground on the under side. When dull, the tip is advanced and resharpened. It may be reground many times, as it is advanced to the front and side in the oblique recess until most of it has been utilized. Only the cutting edge is ground, removing no steel in the process. The clamp and set screw, positioned to avoid abrading, permit smooth, unimpeded chip flow. Tools are made in several styles in the larger sizes.

Engineering NOTES

Storage Battery Welding

Far from the experimental stage, storage battery spot welders are reported to be doing outstanding jobs in production of many critical war items. In one instance, a storage battery welder is making welds with a load on the plant power system of only one-sixth of that required by conventional alternating-current welders.

• • •

Powdered Metal Parts

Improvement in purity of powdered metals, in processing and sintering methods are seen as eventually making possible the production of powdered metal compacts with the same tensile strength as high alloy steels. Already laboratory work has produced parts showing 150,000 psi in tensile tests.

• • •

Infra-Red In Your Home

Amazing postwar products are already developed to bring infra-red heating right into your own home and office to do conventional tasks in new and unusual ways. The cost is surprisingly low.

• • •

Porcelain Enameling

Proper enameling demands the utmost cleanliness of the steel, some plants employing an amazingly intricate and costly sequence of degreasers, cleaning and rinsing baths. A new development is said to clean the dirtiest steel surfaces, even those having colloidal graphite embedded in them from drawing operations, and it is done in one bath followed by a single rinse. Some of largest enamelers in the country are now investigating process.

• • •

Springs at 65 Rockwell C

For years, designers have hesitated to utilize steel springs that were over 40-45 rockwell C. But now a way has been found to make use of high carbon steel springs at hardnesses up to 65 rockwell C, making possible greatly increased efficiency in use of material.

• • •

Robot Assemblers

Already many plants are employing newly developed automatic equipment to feed, locate and drive screws, put nuts on the other side and tighten the assembly. All operator does is shift fixture from point to point.

• • •

Postwar Home Appliances

Aviation Corp., New York, maker of Lycoming engines, steel propellers and precision aircraft parts, is ready to invade the home appliance field as soon as the war is over. Among first of the new products will be an electronically controlled garage door opener, a kitchen range and a heater.

Admiral Corp., Chicago, also is eyeing the postwar home appliance market with plans for the production of a refrigerator, an electric range and a home freezer, in addition to a line of radios. The refrigerator will have a quick-freezing unit and an ultra-violet lamp to reduce food spoilage. Usual cooling coil in the interior of the box will be eliminated.

• • •

New Core Removal Method

A system has been developed that is expected to have far-reaching effect in the foundry industry because it permits making castings in one part that formerly required two or more sections due to intricate coring that could not be removed satisfactorily. Now every particle of sand and oxide can be removed from the most intricate casting, it is reported.

• • •

Statistics In Design

Intelligent use of service records to set up mortality tables is development that spearheads entirely different approach to design of machine parts. Proper use of such information has already made it possible to reduce safety factors (really, our factor of ignorance) to one. This can be of extreme importance in highly stressed parts where light weight is a critical factor.

• • •

Gas Use Cut 30%

Consumption of coke oven gas in drying out open-hearth spouts, ladles and stoppers and for heating converter bottom ovens in bessemer steel shops has been reduced 30 per cent in a Pittsburgh plant by the installation of a gas regulating system. The unit has released about 5 billion B.t.u.'s for other purposes.

• • •

Converting Shells

It probably is not too well known that millions of shells left over from World War I have been used in the present war and filled in a gap when contractors were switching over to war production. The shells were converted for use by fitting them with new nose adaptors.

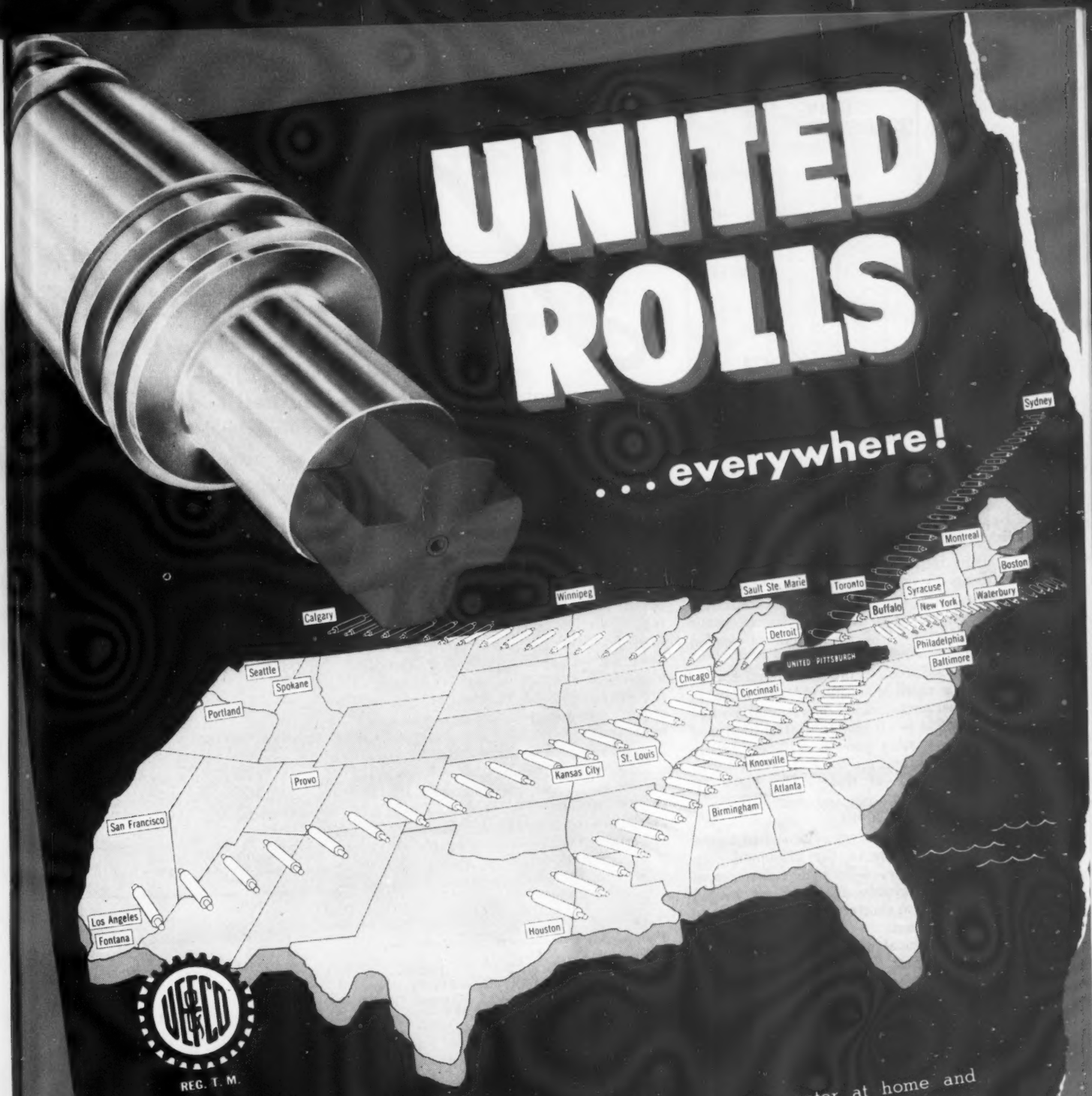
Arc Welders Mounted on Army Jeeps

Modified arc welders mounted on standard quarter-ton army jeeps are being used by maintenance organizations dispatching contact parties in combat areas. Because of compactness and light weight, as well as maneuverability over difficult terrain, these mobile units, made by General Electric Co., Schenectady, N. Y., also have been adopted for jungle use and are designed for air-borne and amphibious operations.

Driven by a V-belt on a power take-off from the jeep's engine, welders are bolted to the floor of the jeep in place of the right-hand front seat. They provide 40 to 250 amperes of current, and are said to be capable of handling electrodes of various sizes up to and including those ½-inch in diameter. Welders are ready for use as soon as the jeep is stopped. A governor, disengaged by a hand-operated clutch for normal operation of the vehicle, maintains engine speed during welding operation, while belt guards and heavy protective covers safeguard personnel. When not in use welders do not interfere with customary use of the jeep, as the closed cover serves as a seat. According to the company, a feature of these welders is that they are not dependent upon a parent organization for resupply of oxygen and acetylene cylinders.

—o—

A 4-page pamphlet entitled "Typical New Models of Burrell Gas Analysis Apparatus" is a forerunner to a new 96-page gas analysis catalog and manual for gas analysts which will contain complete information on all the latest models made by Burrell Technical Supply Co., 1936-42 Fifth, Pittsburgh 19.



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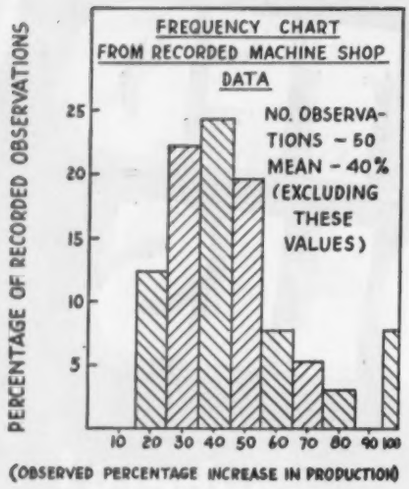


Striking Improvements in Machinability Claimed for *Leaded Steels*

Machinability constants of leaded steel said to be 24 to 35 per cent higher than non-leaded types with increases in feed from 36 to 60 per cent. Phenomenal gains in tool life also held possible by this technique

IMPROVED machinability of many metals now handled in machine shops is probably the least widely recognized of many factors which have led to improvements in shop efficiency during the last few years. One of the more outstanding developments in this field has been the introduction and production of leaded steels.

Leaded steel, as the name implies, contains a small quantity of lead (0.15 to 0.30 per cent), added by a special method applicable to all grades of steel produced by the casting process without greatly altering normal mechanical properties or response to heat treatment. Table III gives substantiating test figures.

Steel machinability is considerably improved, as less energy is absorbed in the cut; temperature of the machined chip (and, therefore, of the tool) is lower; and there is a general tendency for leaded steels to form shorter chips, an advantage in many cases.

An empirical mathematical expression, deduced from data obtained by experimental machining tests, correlates with a fair degree of accuracy, cutting speed, feed, tool life and other factors involved in turning operations under normal machine shop conditions. It indicates that an increase in cutting speed of 25 per cent will reduce tool life by one-tenth. Effects of increasing feed on tool life are not so marked. Thus, a 25 per cent increase in feed will reduce tool life only a quarter.

Tool efficiency (i.e., production efficiency) curves evaluated from the empirical formula clearly show that heavier feeds, giving chip thicknesses greater than 0.003-inch, are far more efficient than lighter feeds producing thinner chips. The use of a material having a higher machinability constant leads to increased production in the machine shop by permitting a higher cutting speed or heavier feed, or a combination of both.

Comparative machinability constants for leaded steels and their non-leaded counterparts, given in Table I, show that machinability constants for leaded steels are greater by 24 to 35 per cent.

This indicates that if leaded steel is substituted for non-leaded steel, otherwise of the same composition and condition, cutting speed can be increased by 24 to 35 per cent without altering other machining conditions. However, it often is better to increase feed rather than speed. Then leaded steels permit increases in feed ranging from 36 to 60 per cent.

If leaded steel is machined without al-

*This article is based on information supplied by a British manufacturer of these steels through the British Information Service.

TABLE I.
Comparative Machinability Constants (approx.)

Type of Steel	Leaded	Non-Leaded	Improvement per cent
Free-cutting	15.5	12.5	24
Semi-free-cutting	11.2	9	24
0.30 carbon	9	7	28
0.40 carbon	8	6.2	29
55/65 ton tensile alloy (heat treated)	6.4	4.75	35

TABLE II.
Production Data For Small Caliber Shell

Material: 1⅝-inch diameter cold drawn bar.

C.	Mn.	S.	P.	Si.	Pb.
0.35/0.42	0.9/1.2	0.06 max.	0.06 max.	0.1/0.25	0.15/0.25

Machines: 6-spindle, 1⅝-inch automatic lathes.
Tool Steel: 18.4.1, H.S. steel. Coolant: Cutting oil.

	Leaded	Non-Leaded
Spindle speed—rpm	276	228
Feeds:		
Form tools, drills, etc.	0.0051	0.0045
Finish form tools	0.00057	0.0005
Reamers	0.0131	0.0115
Cycle time	105 seconds	146 seconds
*Tools reground or changed	3	177
Machine hours worked	60	160
Shells produced	1190	1519
Shells per machine hour	19.5	9.5

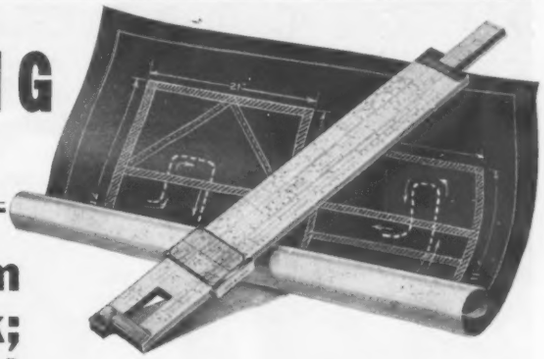
*Treating each tool in the set-up as an individual.

TABLE III.
Mechanical Test Data

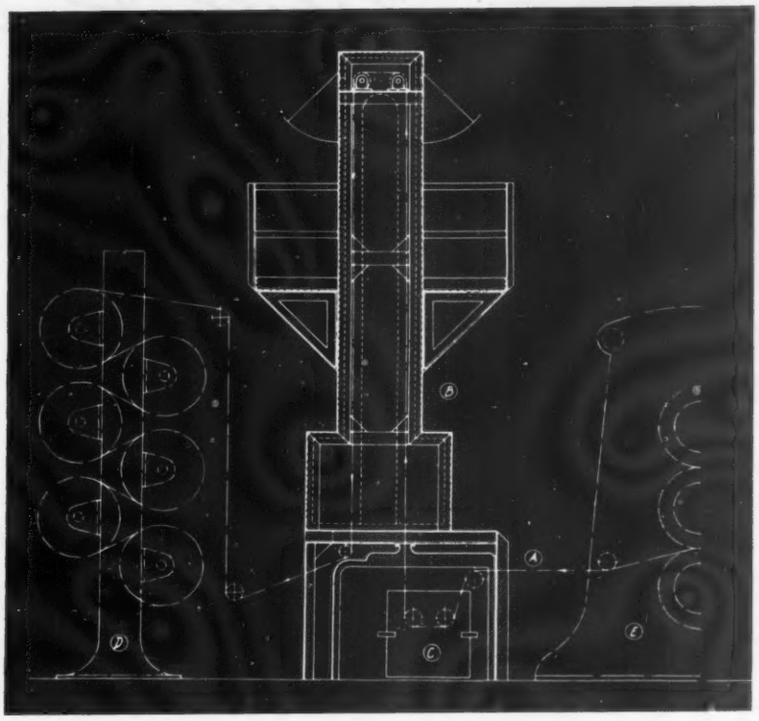
Quality	Condition	Analysis C.	Mn	S.	P.	Ni	Cr.	Pb.	Mechanical Tests Ten. Str.	Elong.	Red. Area	Izod
Free-cutting ¼-inch diameter	Drawn	.13	.95	.235	.051	...	...	...	36.8	24.1	49.0	.....
Leaded ¼-inch diameter	Drawn	.12	.98	.226	.067	...	...	.20	37.0	23.0	50.1	.....
3.S. 1⅝-inches diameter	Drawn	.16	.74	.042	.05	...	...	...	43.3	18.1	54.1	.....
Leaded 1⅝-inches diameter	Drawn	.17	.69	.033	.027	...	...	.22	44.9	16.3	58.0	.....
40% C. 1⅞-inches a/f. hex.	Norm.	.40	.61	.035	.028	...	...	.	36.7	26.0	43.4	24/25
Leaded 1⅞-inches a/f. hex.	Norm.	.42	.61	.034	.033	...	...	.20	39.0	25.0	41.0	25/27
Ni/Cr. 1¼-inches diameter	Heat	.41	.74	.028	.013	1.73	.65	.	67.5	18.0	56.5	55/60
Leaded 1¼-inches diameter	treated	.42	.25	.022	.012	1.74	.65	.17	63.5	18.0	53.0	52/57
2.S.2, 1-inch diameter	Heat	.37	1.45	.008	.02	.28	MO.	...	62.0	22.7	60.7	57/59
Leaded 1-inch diameter	treated	.37	1.45	.008	.02	.28	MO.	.17	60.1	23.6	60.7	55/57

Note: All data presented in this article based on information supplied by a British manufacturer of these steels through the British Information Service.

OVEN ENGINEERING NEWS



IOE Fabric Cementing System Ends Fire and Explosion Risk; Speeds Production, Cuts Cost



Schematic drawing of **IOE** fabric cementing system. (A) Fabric travel. (B) Evaporating tower. (C) Applicator tank. (D) Cooling drums. (E) Calender.

Less than two years ago, when America's synthetic tire program swung into high gear, fires and explosions caused by cementing tire fabrics with a mixture of natural rubber and highly volatile solvents were common occurrences in the spreader rooms of the tire industry. So serious was this new hazard that fabric cementing became of necessity an isolated operation, involving considerable fabric handling, expense and loss of production time.

Today, in plants employing **IOE** fabric cementing equipment, such danger is a thing of the past and tire fabric manufacturing is a non-stop process, with cementing done continuously in the calender train *at calendering speed.*

SAFETY EQUIPMENT

Shown above is a schematic drawing of a typical **IOE** fabric cementing system used in tire manufacture. It may be seen that the dipping and drying process is now integral with the calender train, but the chief causes of explosion and fire (static build-up and improper drying) are absent. They have been eliminated by ingenious static collection equipment and proper conditioning of cement drying atmospheres.

Interlocking controls make it impossible to start the calender train under unsafe conditions, and if danger arises in the train during operation, automatic signaling devices warn calender train operators. All such **IOE** installations have been approved by insurance companies for safe operation.

HIGH PRODUCTION LOWER COST

Since mechanical slowdown in the past occurred in the dipping and drying process rather than in calendering, and since no production line can move faster than its slowest operation, it becomes obvious that the entire manufacturing process has been stepped up tremendously. To be specific, 60-inch material previously cemented at 20 yards per minute now travels 60 yards per minute through calendering and cementing, *bringing a production increase of* 300 *percent!*

Notable economies have also been realized. Because the unit assembles as part of the calender train, no additional attendant labor is required. Through proper engineering, operating costs are cut to a minimum (details on request). Finally, there is an appreciable saving in liner cleaning costs, as well as an increase in the life of the liner itself.

In addition to safety and economy of operation, this system has brought about a decided improvement in the tackiness of the cemented fabric, and controls practically all of the factors governing tackiness.

GLATTE APPOINTED

Hubert Glatte of Buffalo, former assistant purchasing agent for the National Gypsum Co., has been appointed district engineer for **IOE** in the Western New York Territory. Mr. Glatte has been employed in engineering capacities by the Turner Construction Company, the Associated Buffalo Architects and the Buffalo Board of Education. In 1937 he went to National Gypsum Co., where he remained until he accepted his present position with **IOE.**

HUBERT GLATTE

(This is No. 15-R of a series. Reprints of previous advertisements will be sent free upon request.)

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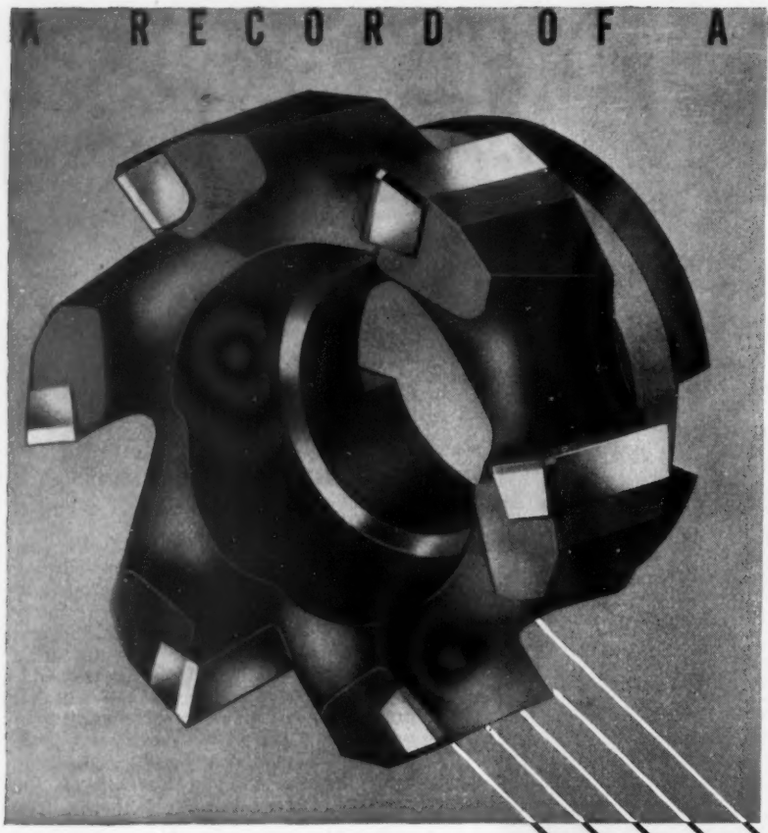

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Blue Streak
SHELL END MILLS

FIVE SIZES
2¼" 2½" 3" 3½" 4"
DIAMETERS

COMPARATIVE CUTTING PERFORMANCE

	HIGH-SPEED STEEL	TANTUNG BLUE STREAK
S. F. M.	80	145
R. P. M.	76	136
FEED	3½"	5½"
DEPTH OF CUT	¼"	¼"
PIECES PER GRIND	2	16

MATERIAL CUT: Hard Nickel-Chrome-Molybdenum-Steel. Machine: Kearney & Trecker, Model K, 7½ HP. A coolant was used. Conventional cut.

YOU CAN GET THE SAME RESULTS! Tantung is easy to sharpen. Easy to operate. Use same technique as for high-speed steel cutters, only increase RPM and FEED. Write for Bulletin V-R 338.

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teration in machining conditions, increases in tool life of from 850 to 2000 per cent may be expected. This theoretical increase in tool life appears to be phenomenal, but it has been substantiated in practice. In one instance, when thread milling heat treated alloy steel, an increase in tool life of 1400 per cent was claimed in the change-over to leaded alloy.

Time is saved through less frequent need for tool regrinding. For example, if tools for a normal set-up were reground once during each 10-hour shift, then leaded steel would allow the machine to run at least 10 working shifts before regrinding. Assuming that the machine is idle for ½ hour while the tool is reground, the saving would be nine tool regrinds with a consequent gain of 4½ hours production in 100 working hours. Net production increase thus is 4.75 per cent. Therefore, while leaded steel gives greatly increased tool economy it is preferable in production to increase speed or feed where practicable.

An empirical formula permits the conclusion that the use of leaded steels can lead to increased machine production varying from 24 to 60 per cent. This does not include improvement in machine efficiency which in practice has resulted in production increases exceeding 60 per cent.

An analysis of 50 machine shop reports on production increases with leaded steels, is reproduced in accompanying chart. The average increase in production was about 40 per cent, with a range of from 20 to 100 per cent. This chart substantiates the anticipated increase in production deduced from the empirical formula.

These results are supported by actual machine shop experience with leaded steels.

A firm which in peacetime manufactured automotive accessories and equipment recently conducted large-scale and detailed tests of a cold drawn leaded medium-carbon steel in producing small caliber shell bodies. Table II gives a summary of the report, and the 6-spindle automatic set-up. A change to leaded steel increased spindle speed, and therefore cutting speed, 21 per cent. All tool feeds were stepped up 14 per cent. Net production increase was 39 per cent.

Tool Life Lengthened

In addition to increased speed and feed, important gains were made in lengthening tool life. With improvement in machine efficiency, 19.5 leaded steel shell bodies were produced per machine hour as compared with 9.5 of non-leaded steel. This was equivalent to an output increase of just over 100 per cent.

Another large plant produces a D-section clinch nut of both ordinary and leaded free-cutting steel. Data in Table IV are based on its experience. An output increase of 50 per cent was recorded, chiefly due to higher cutting speeds.

In manufacturing plain $\frac{7}{16}$-inch hexagon nut blanks, chamfered on one side, 1224 nuts per hour were produced on a special automatic machine using leaded steel. Cutting speed was 215 feet per minute; parting-off feed—0.0016-inch per revolution; forming feed—0.0017-inch per revolution; drill feed—0.004-inch per revolution; and tool life between grinds—3 hours. Under these conditions, with non-leaded steel, results were so poor that it was necessary to make substantial reductions in cutting speeds and feeds.

By increasing feed, one firm claims that the changeover to leaded steels has resulted in an increase of 50 per cent in production of a hand-operated capstan lathe stud. Tools are said to last twice as long between grinds. With the same tool life, cutting speed may be increased by about 6 to 7 per cent, with correspondingly greater output. Data for this job are given in Table V.

Reports thus far discussed have dealt with leaded steels of the carbon and free-cutting types, but the improved machining characteristics claimed for other grades also are worth noting.

An example of increased production efficiency through the use of a leaded alloy steel is shown by the plant of a spark plug manufacturer. A spark plug body of heat-treated manganese molybdenum steel is produced on 5-spindle automatics using high speed steel tools and a cutting oil as coolant. This component formerly was made from a heat-treated alloy steel. Details are given in Table VI.

Circular form tool life was increased by 250 per cent (three and one-half times as long as previous life); scrap was reduced 25 per cent due to the better finish etc., consumption of cutting oil was reduced 12 per cent, due to the more conveniently compact form of swarf, giving less scatter and better recovery. A greater output rate was due to a combination of a small increase of speed and a larger increase in feed. Short curly swarf, characteristic of lead-bearing steel, is an advantage in automatic lathe work, as it insures economy in coolant and assists in disposal.

TABLE IV.
Production Data for D-Section Clinch Nut

Material: $\frac{9}{16}$-inch dia., D-section, free cutting steel.
Machine: 4-spindle automatic.
Coolant: Soluble oil.

	Leaded	Non-leaded
Spindle speed (r.p.m.)	1,600	1,050
Feeds	No change	.. ..
Parts per hour	360	240
Tool life	8 hrs.	8 hrs.

TABLE V.
Production Data for Patented Stud

Material: $\frac{7}{16}$-inch dia. leaded free cutting steel.
Machine: Capstan lathe. Coolant: Soluble oil.

	Leaded	Non-leaded
Spindle speed (r.p.m.)	1,980	1,980
Feed, inches (Turning)	0.007	0.0045
(Hand) ins. (Forming)	0.003	0.002
Average hourly output	150	100
Tool life	6 hrs.	3 hrs.

TABLE VI.
Production of Spark Plug Body

Material: Heat-treated manganese-molybdenum steel.

C.	Mn.	S.
0.32/0.37	1.4/1.6	0.05 max.

P.	Si.	Pb.	Mo.
0.05 max.	0.25	0.15/0.25	0.25/0.35

Operation	Nominal Increased Rate of Output
Automatic lathe	31 to 33⅓% Improved machine efficiency will give a value higher than this for actual machine output.
Facing on drilling machine	100% by eliminating an intermediate facing operation.
Tapping	17½%
Thread milling	12½% to 20½%
Inspection	15% saving in time due to better finish.
Tool setting	45% saving in time due to fewer regrinds.

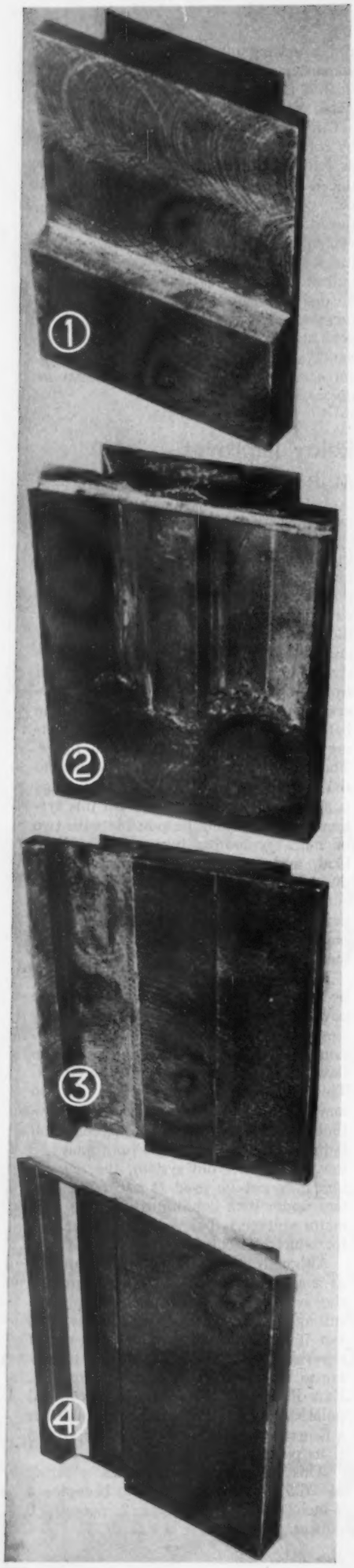
Relay Improves Multi-Generator Systems

A new relay, said to be capable of measuring two voltages, subtract one from the other and act according to the arithmetic result, produces improvement in the operation of multi-generator, direct-current systems aboard airplanes. With the conventional reverse-current relay and cutout system, a direct-current generator on an airplane is disconnected from the power system if instead of delivering current it draws current from the battery or another generator, thus acting futilely to drive the engine faster. The cutout reconnects the generator to the system when its generated voltage is above a fixed amount. With this system conditions may be possible with two or more generators in parallel at light load, under which reverse-current relay disconnects a generator only to have the cutout reconnect it. This sometimes happens with such rapidity that the relay chatters and may shorten life of the contacts.

This device is called a differential relay becaues it connects the generator to the power-supply circuit only when its voltage is above the circuit voltage by a certain amount, i.e., only when power can flow out of the generator into the circuit. This is said to stop chattering. It also may be possible to generate power anytime generator voltage is higher than battery voltage, although both may be low. With the old system, the generators may not be used to assist the battery under such conditions, because generator voltage is below the fixed amount for which the cutout is calibrated.

Although the relay cannot function as a circuit breaker, it is said to protect the system against reverse currents resulting from generator short circuits. On test it has interrupted 3500 amperes at equivalent of 50,000 feet altitude, according to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Like conventional polarized relays, it makes it impossible for a generator to be connected to the system if its polarity is reversed.

This differential relay, with a rating of 28.5 volts, 300 amperes, occupies a 4-inch cube and weighs 2 pounds, 6 ounces.



Salvaging

High-Speed Steel Scrap

Shortages of materials and tools in England re-emphasize importance of conservation and reclamation. Greater care in use of high-speed steel, diminution of sizes and use of valuable scrap as inserts brazed to mild steel pads and for teeth in slotting side and face cutters are found effective

By
ERIC SIMONS
Edgar Allen Ltd.
Sheffield, England

QUICKENING of the tempo of industrial salvage was, for Britain, one of the first effects of intensified production for war. It was combined with the vital necessity of economizing in shipping space and the inevitable shrinking of sources of supply of raw materials. When Japan entered the conflict, supplies of tungsten that formerly came to Britain by way of Burma and China suddenly declined. Tungsten, essential for the manufacture of high-speed tool steels, thus had to be most carefully conserved.

There was, of course, considerable scope for economy in this direction, and many different plans were made in works throughout the country to save high-speed steel by greater care in use, diminution of sizes used, and the forging down of odd or obsolete sizes to those more readily usable. Advice and instructions to this end were issued by various Government supply departments. One special method of salvaging high-speed steel scrap is, however, sufficiently unusual to warrant description.

Tool service departments of works both large and small often lack the requisite equipment that would allow them to reclaim a higher percentage of scrap high-speed steels. In others, it may be that proper maintenance labor is not available. These difficulties largely have been overcome in Britain as the war progressed, but it was found that there were many other opportunities, under correct shop guidance, for the staff and personnel of plants to discover methods of reclaiming valuable waste steel that otherwise would have passed to the dump.

Apart from the fact that reclamation is a national service, it also is important to production, because it provides tools that can be put into service immediately as they do not need to be specially ordered. Delay in delivery does not occur, and the balance of production may be maintained.

One special method is as follows: Scrap ends of 6-inch long copper band tools used on Hepburn machines for shell production are salvaged. This type of tangential tool has a large depth of drag or wear on the canalure projection, as those who have used this design will immediately recognize. This governs the quantity of stock to be removed when tool is sent to be reground, and it is ascribable to lack of proper side clearance.

By the salvaging process adopted, the broad form tool is split up and a salvaged piece of high-speed steel inserted to take the canalure or groove, as well as the small blends on either side. In this way not only is economy effected by the employment of scrap ends, but the life of the form tool itself is greatly increased.

Method of operation employed is to form the band with a tool having no canalure projection, and to pass on to the copper band machine proper. This machine has the canalure tool mounted on the front tool post, the finisher being on the back post, as in the normal practice.

The tools were made up by annealing the scrap high-speed steel ends, leaving

(*Please turn to Page* 166)

Fig. 1—*Pad, ready for the tip*

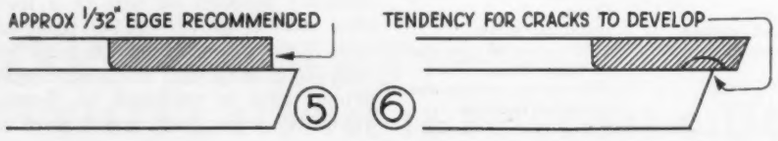
Fig. 2—*Tool ready for grinding operation*

Fig. 3—*Pad machined to take the salvaged canalure piece*

Fig. 4—*Brazed insert ready for grinding*

Fig. 5—*Design of tip found to be most effective*

Fig. 6—*Design of tip liable to develop cracks*



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ON BOTH YOUR FINE WORK AND FORESIGHT ON THE PAYROLL SAVINGS PLAN!

IN your wholehearted support of the Payroll Savings Plan, you are doing far more than backing the most valid system of war financing—and building a powerful dam against the onrush of dangerous inflationary dollars.

By encouraging the all-out participation of your employees in this greatest of all savings plans, you are helping to create a sound economy for post war days.

With this same plan, you are assisting working America to build a mainstay against the inroads of unemployment and want—to save for homes, educational advantages and old age comforts!

You and your employees, through *mutual* cooperation in this forward-looking plan, are gaining a new and closer understanding—the cornerstone of a firmer, *mutually* profitable relationship!

National benefits, too, follow the "All Out" effort you are making! The prosperity of our United States rests on the economic stability of both management and labor. Your Payroll Savings Plan is working constructively toward the assurance of both!

The Treasury Department acknowledges with appreciation the publication of this message by

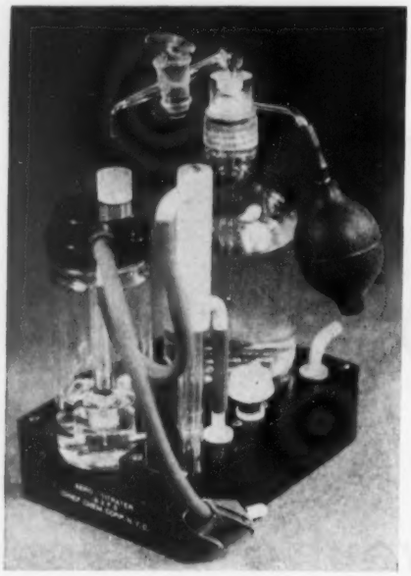
STEEL

★ *This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council* ★

INDUSTRIAL EQUIPMENT

Water Analyzer

Designated as Aero-Titrater, the water analysis apparatus introduced by Chief Chemical Corp., 55 West Forty-second street, New York 18, furnishes the plant operator and laboratory technician with a precise method for the determination



of hardness, calcium and magnesium in waters, both industrial and potable. It is also applicable to water problems in process industries.

It makes use of a new endpoint based on the foam-meter principle. This endpoint is reproducible with a high degree of precision. The instrument is supplied calibrated and ready for assembly and use. There are no moving parts and all vital parts are of plastic construction. The ratio of calcium and magnesium present does not affect the determination; there is a single endpoint for stoichiometrically equivalent quantities of calcium and magnesium, regardless of the relative amounts present in the water.

Samples of 50 milliliters or less are required. The apparatus can be used on the field and in the plant. It can be used directly with samples which contain chlorides up to 2000 ppm. Sulphates up to 1000 ppm are also without effect. Large iron concentrations and the treating and conditioning chemicals and compounds used in boiler waters do not interfere. Accurate determination of calcium and magnesium in boiler scales, minerals, plant ash, rocks, sediments and similar materials can be made.

Hydraulic Valve

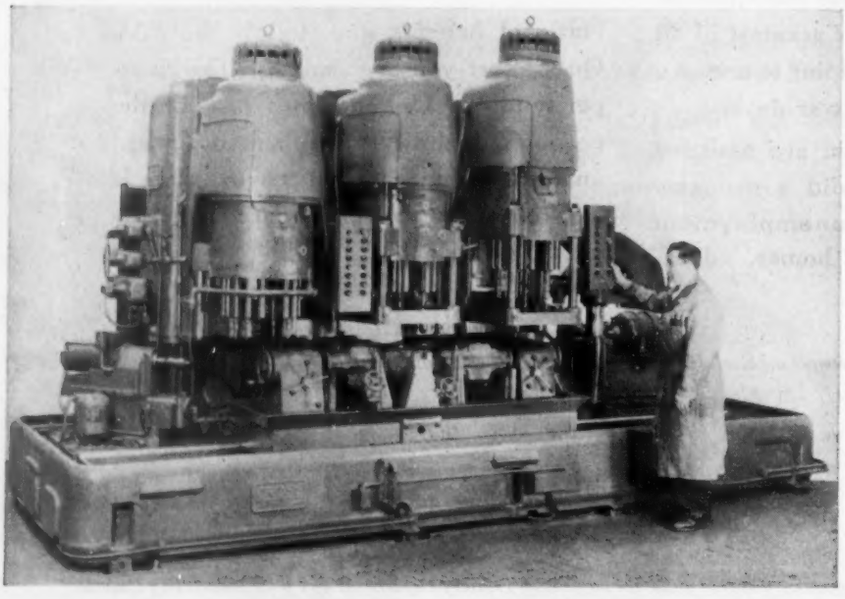
A ¾-inch hand operated hydraulic valve was developed by Galland-Henning Mfg. Co., Milwaukee, Wis., for leakproof service on ¾-inch hydraulic lines at pressure up to 300 p.s.i. It features a patented cored disk, precision hand lapped surfaces of disc and seat, line pressure-sealing and finger-touch control, as well as a stuffing box with gland nut in the valve-stem assembly.

The valve is made in all bronze construction, with lubricating channels in disc and seat, for water hydraulic service and in semi-steel without lubricating channels, for oil-hydraulic service. They are available in hand, foot and solenoid models in a complete range of sizes.

Boring and Tapping Machine

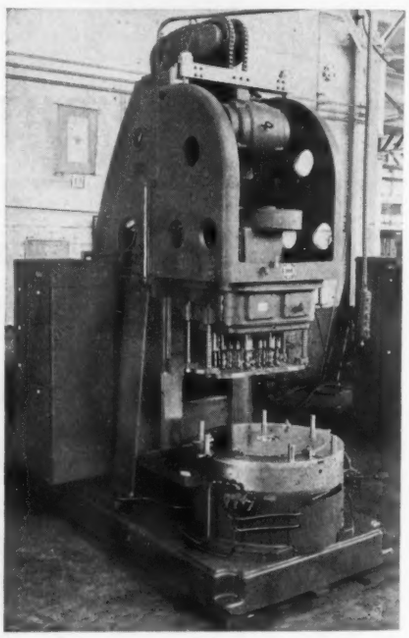
A new transfer type three station machine drills, countersinks and taps assembly holes in the bowl-face and simultaneously two grease drain holes in the side of the bowl in front and rear axle housings of 4 and 6-ton heavy trucks. The machine has three 10 horsepower independently powered, multiple spindle heads mounted on a base with a table that indexes the work from station to station. The table carries a work-holding fixture which is arranged to accommodate both front and rear axles. The multiple spindles are arranged in the heads to permit working on the two different diameters of bowl-faces. Two single spindle units at the left and below the drilling and tapping heads operate simultaneously with them in processing the two bowl holes. All elements of the machine operate automatically by electric push button control.

In the push button sequence after work is loaded, a locator swings over and locates the casting in the fixture. Power clamping is then applied and locator swings back. In three successive indexes the table then moves the work under the heads for drilling, countersinking, and tapping and returns to loading position. This machine is built by Cross Co., Detroit.



Drilling Machine

The new No. 540 vertical hydraulic feed machine introduced by Defiance Machine Works Inc., Defiance, O., is designed for heavy duty single or multiple spindle drilling, boring, reaming, or milling operations. The column is of heavy-type cored casting with long ways which carry the head slide. The ways are oiled by a Bijur oiling system. The column



supports the hydraulic feed cylinder which operates the head and also encloses the weights that counter balance the head and slide.

The machine is provided with an automatic cycle of approach, feed and return to stop. The cycle can be arranged with a dwell at the end of feed if desired. The head is driven through multiple V-belt and provided with a pair of pick off change gears to give a speed of 200 to 500 revolutions per minute as selected at the power take off. The main drive bracket and head are automatically lubricated.

The machine shown here has a 28 spindle head and fixture for drilling 11/16-

(All claims are those of the manufacturer of the equipment being described.)

WE RUN RINGS AROUND AN IDEA

. . . to Save Machining Costs

New ideas, new machines, often mean new and bolder demands on the art of ring fabrication so that machining costs may be brought within the realm of reason . . . a challenge which we have met as our stock in trade for more than half a century.

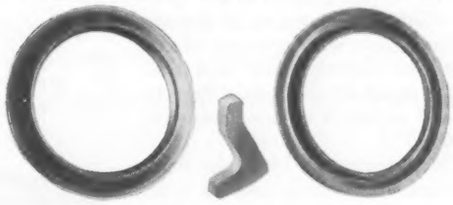
We have been making Dresser Couplings for 65 years . . . products which demand accurate fabrication through rolling, welding and sizing of many circular shapes . . . setting new standards for roundness, flatness, and flawless strength. Today this "know-how" is solving knotty design problems in urgent war production—and now is available to solve your problems.

Dresser has the equipment and engineering skill to produce rings of varied section up to 96 inches in diameter, depending on sectional dimensions . . . at such close tolerances that machining is reduced to a minimum. Send us your inquiry, or write for booklet "Rings for War".

Dresser Mfg. Division, Dresser Industries, Inc., Bradford, Pa.

Dresser Rings

. . . a new way to lower machining costs and save materials.



Typical is this odd-section ring, which saves hours of machining time compared to conventional methods.

DRESSER RINGS and FORGINGS

inch holes in large diameter plates ¾ and ⅜-inch thick. For this operation, the machine has a 42-inch three station indexing table. The table has a ball thrust bearing on the end of trunnion bearing and every time the index pin is disengaged, the table is lifted up slightly by a lifting device which allows the table to be indexed easily. The index pin and lifting device are controlled by a hydraulic cylinder. The machine is arranged so that the table must be in the proper position before the machine can be started in its automatic cycle.

Disk Grinder

A new all purpose disk grinder for any type of metal, wood or plastic material has been developed by Kindt-Collins Co., 12651 Elmwood avenue, Cleveland 11. It is made in two similar models, regular and heavy duty, the regular model using cloth or paper abrasive disk and the heavy-duty model employing an inch-thick, heavy-duty grinding disk.

Principal features of design and construction include a 30-inch disk with

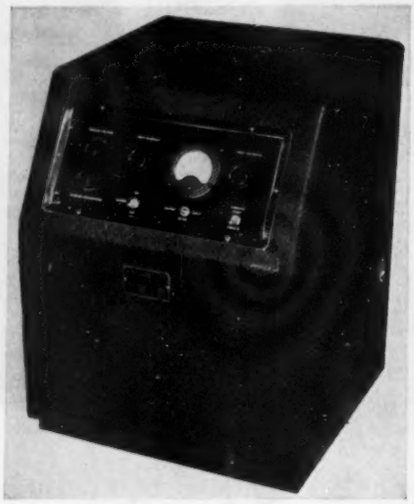
26-inch high grinding area; hydraulic controls which eliminate all gears, worms and jack screws ordinarily employed for raising, lowering and tilting the table; an accurate position stop provided on protractor for stopping table in any position from 45 degrees down to 15 degrees up; ventilated table with properly placed perforations to channel dust into dust guards; and paper or cloth disks may be removed and replaced without removing the steel disk.

A handle operates the hydraulic valve and a 10-inch handwheel controls every hydraulic operation. Start and stop button control is mounted at eye level on the front of the machine. The table, 37½ inches from the floor, affords unusual flexibility in operation. It can be lowered to 4 inches from the bottom of the disk. Protractor degrees are large and clearly engraved.

The motor is mounted on a hinged pedestal over the shaft, driving the main shaft through three V-belts, making possible highly accurate speeds for grinding. Disk speed is 800 revolutions per minute, giving a rim speed of 6260 feet per minute. The regular model is equipped with a 3 horsepower ball bearing, 1150 revolutions per minute alternating current, 2 or 3 phase motor, while the heavy duty unit uses a 5 horsepower motor of the same type.

Voltage Regulator

For supplying constant voltage alternating current power to units requiring stable voltage input, Harry W. Dietert Co., 9330 Roselawn avenue, Detroit 4, announces a new large electronic voltage

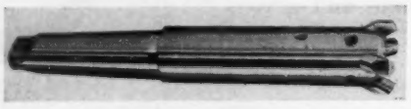


regulator. This unit is suited for converting the fluctuating voltage obtained from commercial 115 volt, 60 cycle, alternating current circuits to a highly stabilized voltage to operate precision photoelectric densitometers and similar equipment.

Output power is 160 watts at 110 volts, alternating current. The output voltage may be adjusted from 100 to 120 volts. The electrical regulation factor is about 1000, reducing a 10 volt input fluctuation to a few tenths of a volt. A frequency change in the input voltage will not vary the output voltage.

Cutter Tools

The bits of four-cutter tools made by State Mfg. & Construction Co., Franklin, O., are inserted at a 30-degree angle. The inner end of each bit impinges

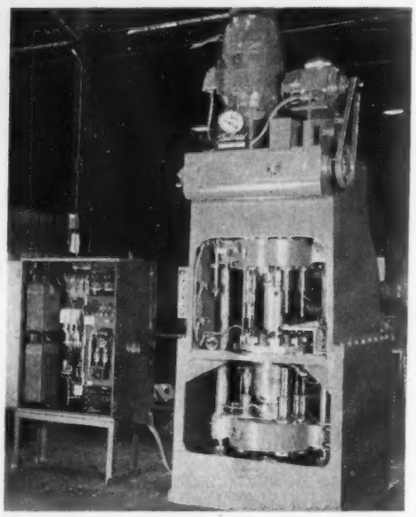


upon a finely threaded screw whereby the bit can be protruded for regrinding or for machining a hole of larger diameter. The bits are held in position by individual setscrews.

Built in a variety of standard sizes, with fluted or plain bodies, the tools range in cutting diameters from ¾ to 4¾ inches. The clusters of bits can be expanded in circumference ⅛-inch in the smallest model to 1¼-inches in the largest for increasing cutting diameters. Special models incorporating duplex heads for cutting two or more diameters, pilots, collars, facing bits, wear strips, center oil holes, etc. can be made to meet customers' requirements. The cutters are used for hogging, counterboring, finish drilling and reaming.

Indexing Machine

Designed for use in connection with a variety of operations on a universal joint body, an eight station indexing machine is offered by Davis & Thompson Co., 6411 West Burnham street, Milwaukee 14. Power for the spindles is supplied by a 25 horsepower motor. Feed and traverse are accomplished by a 1½ horsepower Thy-Motrol motor in conjunction with a two speed electrically operated gear box built into the top of the machine. Spindle heads are driven through a spline shaft and fed by two screws equipped with adjustable nuts. Feed can be varied from ½-inch to 7

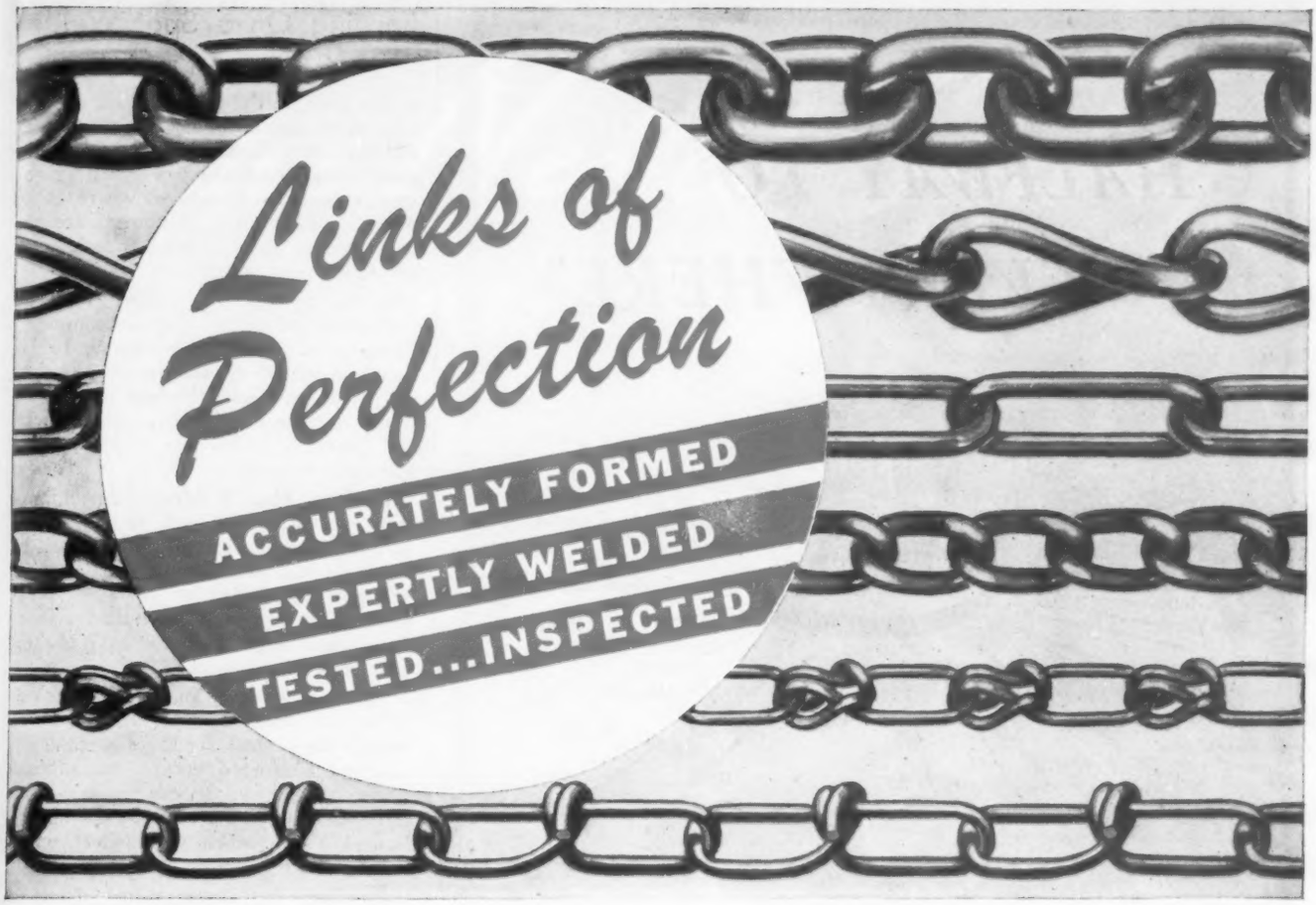


inches per minute and traverse is 100 inches per minute.

The machine is hand locked and manually indexed. Machine will not feed unless the drive motor is operating. Feed can be stopped and reversed by pressing the emergency button. Anti-friction bearings are used wherever possible. A forced lubricating system is employed through the machine. Coolant pump is also provided. The heads are balanced, one acting as a counter weight for the other through use of spring loaded sheave.

Speed Reducers

Cullman Wheel Co., 1350-C Altgeld street, Chicago 14, announces new types of speed reducers. These units range in size from ½ to 10 horsepower. They feature ratios up to 5:1 on single type and 20:1 on the double type and use 1200 or 1800 revolutions per minute motors. The helical pinions and gears supported on ball bearings are enclosed in an oil tight housing.



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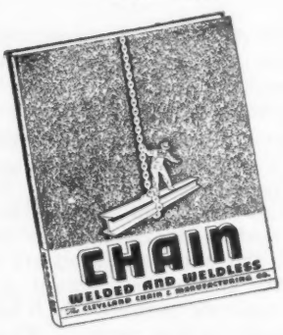
Wars and rumors of wars have never changed the fine uniform quality of Cleveland Welded and Weldless Chain. Year in and year out it serves thousands of important chain needs. Today The Cleveland Chain & Mfg. Co. is engaged in the production of chain for the Army, the Navy and every other branch of the armed forces. The quantity of Cleveland Chain for essential civilian requirements is far from adequate, but we are doing our best to supply you with Chain up to the limit of our war-restricted capacity. When the war is won you will find us a reliable source of supply for the Chain that enjoys a reputation for quality and dependability among men who know.

Highest Grade Chain Since 1869



Cleveland Chain Catalog No. 40 available upon receipt of your letter of request.

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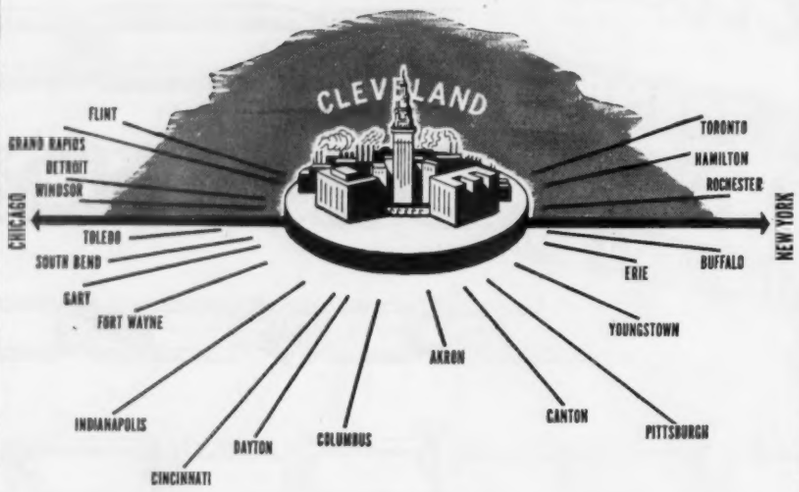
ALL TYPES OF CHAIN . . . WELDED, WELDLESS AND FLAT METAL CHAINS

"HALFWAY TO EVERYWHERE"



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Euclid at East Sixth THE NATIONAL CITY BANK 1845 CLEVELAND'S OLDEST BANK *and Terminal Tower*

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Forging On a Spot Welder

(*Continued from Page* 107)

in the plate and upper electrode enables heat to be conducted rapidly away from all but the extreme lower end of the pin. Thus no softening or upsetting occurs except in the plate where it is wanted. Electrodes, of course, are refrigerated in order to control their temperature.

Entire operation is rather fast, as parts come off of the machine complete. There is no grinding or burring to be done. Some 50 assemblies are completed per hour. And absolute uniformity is assured because the complete current and pressure cycles are under precise automatic control.

Replaces Plug Welding: An important application for spot welding with variable current and pressure cycles in this plant has been found on fabrications formerly requiring considerable plug welding. Many parts are built up from panels and angle sections such as the door shown in Fig. 3.

This unit is 3 feet long, 1½ feet wide. It is made from a single flat piece of ⅛-inch thick steel sheet (approximately 11-gage) reinforced around its circumference and at two points across the central section by 1¼ x 1¼-inch angles formed from ⅛-inch thick sheet on a press brake.

Formerly the angles were joined to the flat panel by punching a ½-inch diameter hole every 2 inches along their length. Then the angles were assembled in place on the panel and joined to it by arc welding through the holes to deposit enough material to fill the holes and a slight excess. This plug welding was done by hand, using ⅛-inch coated electrodes. It required the services of a welding operator and a fitter, one of which was always idle since they could not both work on the same piece at once.

Then the assemblies were finished by grinding off the excess weld metal to produce a smooth surface at the plug welds. All of these steps consumed considerable time because of the large number of plug welds that had to be made.

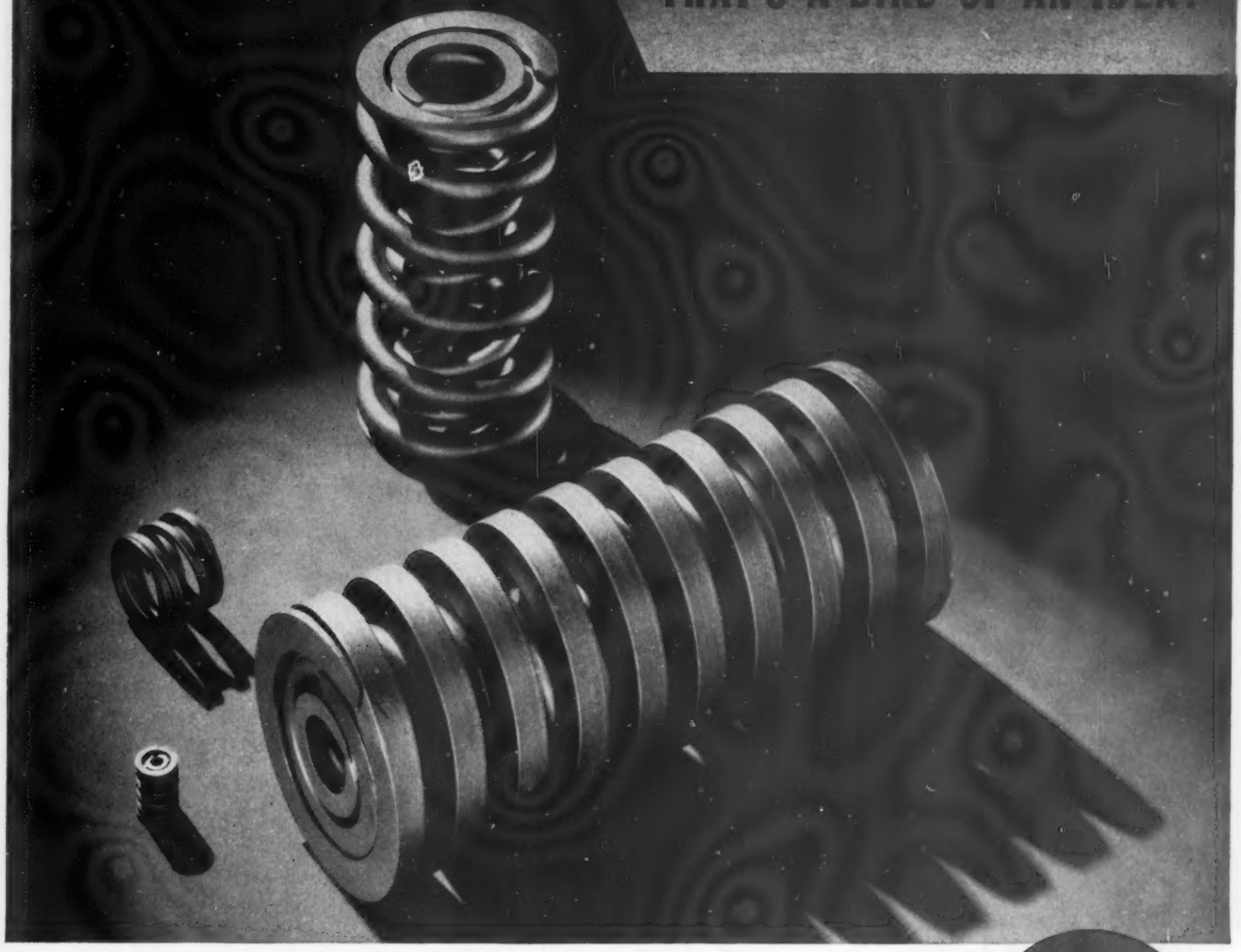
Now the heavy duty spot welder assembles the reinforcements to the panel by making a series of spot welds along each reinforcement.

One of the problems involved is the fact that the angle sections are scaly. The panels are shot blasted. However, the variable current and pressure cycles take care of the condition in this manner: The welding controls are now set to first give a low current at rather high electrode pressure which breaks up any scale or rust present. This is immediately followed by application of a higher preheating current to prepare the metal for the weld, maintaining the high electrode pressure. Then electrode pressure is reduced as the current is raised for making the actual weld.

All the spot welds around the periph-

The Nested Spring

THAT'S A BIRD OF AN IDEA!



● How to pack more spring into less space has always been a problem in product design. And today, when so many plans call for a reduction in product size or packing more power into a unit of the same size, the problem is even more serious. The nested spring is often the answer. It eliminates, in many cases, changing the size or design of the assembly in order to provide working space for a spring of increased capacity.

Send for free booklet on the importance of spring design.

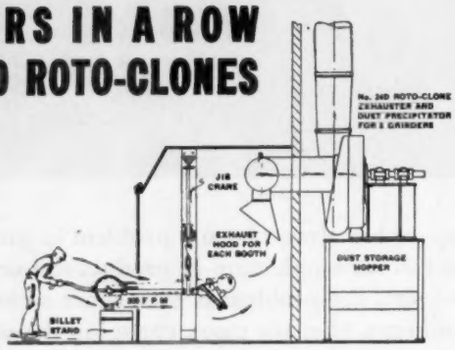
Designing nested springs requires more than just fitting one spring inside another. Whether to use round or square wire or a combination of both is involved. Extremely careful attention must be given to proper stresses and clearances. These, plus many other factors, emphasize the need for skilled spring engineering, and that's why so many product planners bring their problems to MUEHLHAUSEN SPRING CORPORATION, *(Division of Standard Steel Spring Company)*, 921 Michigan Ave., Logansport, Ind.

***To improve product performance, use* MUEHLHAUSEN Designed SPRINGS**

ROTO-CLONE KEEPS BILLET GRINDING *Dust Free!*

View above shows two of the nine No. 24 Type D Roto-Clones serving the swing grinder booths shown at the right.

44 BILLET GRINDERS IN A ROW SERVED WITH 9 TYPE D ROTO-CLONES


No. 24D ROTO-CLONE EXHAUSTER AND DUST PRECIPITATOR FOR 5 GRINDERS
JIB CRANE
EXHAUST HOOD FOR EACH BOOTH
DUST STORAGE HOPPER
BILLET STAND

Drawing shows the simple construction of an AAF-engineered swing frame grinder booth.

This picture, taken in one of America's leading steel mills, shows a pronounced absence of dust all along an impressive line-up of swing frame grinders. Dust is drawn into the individual booths by the rapid flow of air induced by the Roto-Clones and precipitated by their rotating impellers — *at the rate of a ton a month per unit.* Roto-Clone has but one moving part and requires the very minimum of maintenance; is extremely compact and can be placed close to the equipment it serves — with resulting savings of space and piping and power. These advantages and its high dust separating efficiency have led the operators of this same plant to purchase 16 additional Roto-Clones for other dust collecting jobs. Consult with AAF engineers about your dust problem — there's no obligation. Send for Bulletin 272.

AAF

AMERICAN AIR FILTER COMPANY, Inc.
Incorporated
443 Central Avenue - Louisville 8, Kentucky
In Canada: Darling Brothers, Ltd., Montreal, P. Q.

ery of the panel and across the two central reinforcements are made in a total of 20 minutes. Only one operator is required. *The saving in production time alone on this one application saved entire cost of welding machine first year it was in use, according to company engineers.*

Ample Strength: Another important application of heavy duty spot welding in this plant is in fastening hinges to door sections. These hinges are made from 3/16-inch thick stock and formerly were plug welded to the doors. However, this involved considerable hand work in depositing the weld metal by hand and in grinding off the welds to finish them.

Now the hinges are spot welded to the doors on the heavy duty machine. Yet more than ample strength is obtained. While the specifications call for 20,000 p.s.i. on shear tests, actually values up to 36,000 p.s.i. are obtained. This illustrates the excellent quality of work that is being done.

Important production savings have also been obtained here by elimination of plug welding and grinding.

Balanced Three-Phase Load: An important feature of the heavy duty welder used is that it pulls a balanced load on the power lines. This machine is of the new three-phase-to-single-phase type described in STEEL, Oct. 9, 1944, p. 126. Instead of putting a load of several hundred kilowatts on a single phase of the power line, thereby seriously unbalancing the line loading, the new system first converts the three-phase alternating current to direct current by means of rectifier tubes; then additional electronic equipment is employed to reconvert the direct current into single-phase alternating current at frequencies ranging from 3 to 25 cycles per second.

Not only does this eliminate unbalanced loading of the power supply lines but it also makes available exceptionally heavy currents for any period demanded by the heating or welding cycle. The low working frequency is significant in that it greatly reduces inductance losses from large throat openings in heavy duty spot welding.

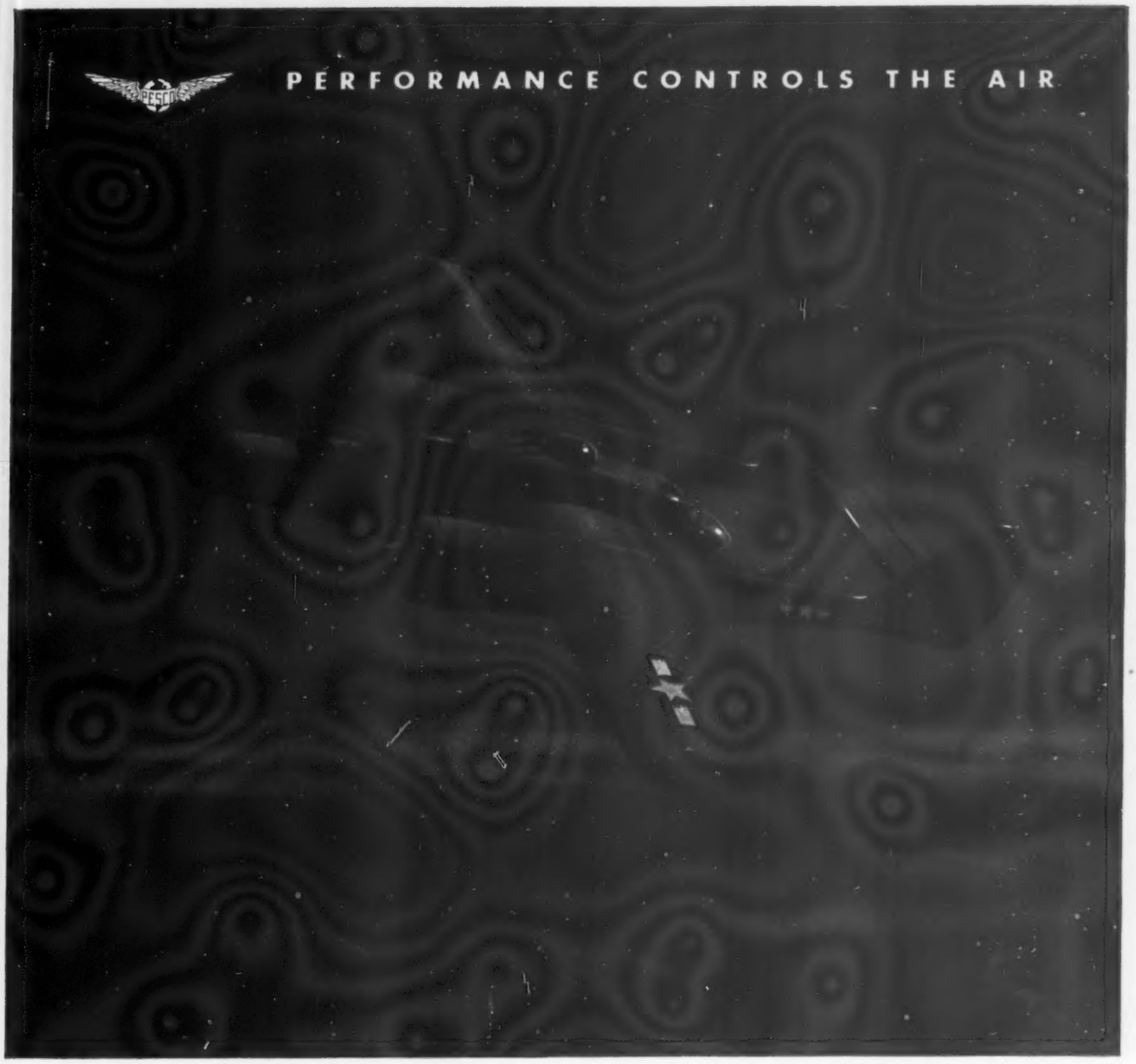
Variable Current-Pressure Sequence

To show what occurs during a typical variable-current variable-pressure welding cycle, let's follow one through: When the parts to be spot welded have been positioned between the electrodes, the operator initiates the welding sequence by stepping on a foot switch. He does not need to hold the switch down, for once started, the entire sequence of operations proceeds under automatic control as follows:

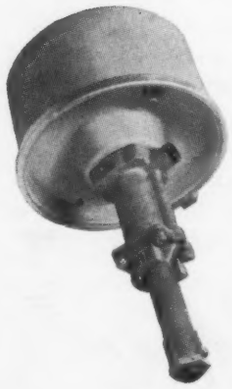
First, air is fed to the top of both air cylinders located above the top arm or electrode of the machine, causing the upper electrode to descend and build up an initial pressure on the work pieces to a predetermined value set in advance by an air gage and pressure regulator.

When the requisite "precompression" pressure has been attained on the work, a pressure operated switch causes the preheating current to flow through the

PERFORMANCE CONTROLS THE AIR



NORTHROP BLACK WIDOW. The P-61, deadly Army night fighter is acclaimed the largest fighter ever built. It has the range of a medium bomber . . . the speed and climb of a pursuit ship.

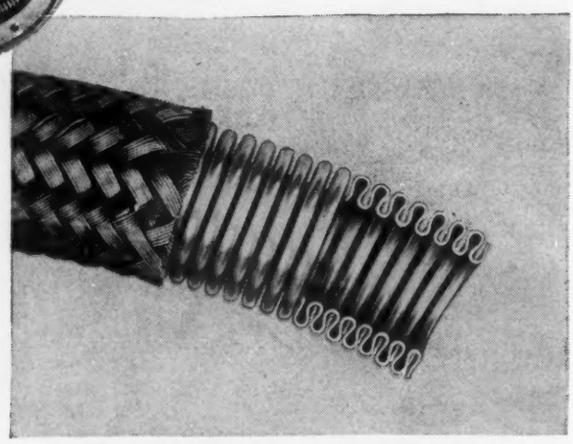


PESCO UNIVAC FOR AIRCRAFT . . . new hydraulic brake intensifier for planes up to 30,000 pounds in weight. Compact, lightweight, completely packaged and protected. The PESCO *Univac* installed in the braking system, gives the pilot a more responsive "feel". This added ease and accuracy of control is of great value in ground maneuvering. The *Univac* operates in conjunction with the PESCO Air Pump. PESCO Products Company, 11610 Euclid Avenue, Cleveland 6, Ohio (Division Borg-Warner).

In Aircraft Hydraulics, Fuel Pumps, Air Pumps, Related Accessories...

PERFORMANCE POINTS TO *Pesco* FIRST

AMERICAN SEAMLESS COOLS X-RAY TUBES



Note how American Seamless Flexible Metal Tubing is formed from a seamless, rustless, bronze tube. In most applications one or more bronze wire braidings are added, depending on the service for which it is designed.

ENGINEERS of the Machlett Laboratories, at Springdale, Conn., world's largest manufacturers of X-ray tubes, have found in American Seamless Flexible Metal Tubing, the solution to the problem of compact, efficient cooling for X-ray tubes.

A length of bronze American Seamless, without the customary wire braiding, is coiled around the inner surface of the cooling jacket and connected to a water inlet and outlet. The Roentgen tube is then inserted in the jacket and the ends sealed.

In operation, the tube is surrounded with oil which absorbs the heat from the tube. Cooling water, flowing through the American Seamless coil, removes the heat from the oil. As will be seen in the illustration, the flexibility of this tubing permits it to conform perfectly to the chamber wall. Its seamless construction eliminates leakage problems, while its thin-wall, bellows-like construction assures high efficiency in heat transfer, the bellows rings having the effect of cooling fins.

If you have a problem in conveying liquids, gases, steam or solids . . . isolating vibration . . . connecting moving parts or compensating for misalignment, you will be interested in the wide variety of "American" Products for these purposes. Send for a copy of Bulletin No. SS-50. 45201

ANACONDA *American Metal Hose*

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY • General Offices: Waterbury 88, Conn.
Subsidiary of Anaconda Copper Mining Company • *In Canada:* ANACONDA AMERICAN BRASS LTD., *New Toronto, Ontario*

BUY WAR BONDS—Saved Dollars mean Saved Lives

electrodes. When the preset time interval has expired, an electronic timer causes the current to increase to the full welding value, whereupon another timer operates a control valve to admit compressed air to the lower part of the top air cylinder. This air pressure is also adjustable and is a lower value than that used in the top part of this cylinder, thereby reducing the electrode pressure to a value suitable for welding. Another electronic timer permits an adjustable time lapse between the instant the welding current proper is applied and the moment the pressure is reduced.

A third preset timer then interrupts the welding current at end of the welding period and causes the back pressure of the interrupting cylinder to be exhausted, restoring full pressure to the electrodes. This is called "recompression". The high pressure thus produced forges the weld while it is still hot.

The length of time the recompression pressure is applied is controlled by another timer. Thereafter, the electrodes automatically part and the work can be removed or moved ahead to the next welding position.

For making welds around a periphery or wherever a quantity is wanted in making an assembly, a "repeat" switch on the control panel can be set to cause the entire welding cycle to repeat automatically after a certain lapse of time. For example, a typical welding cycle may require a total of 6 seconds. The repeat timer then can be set for 3 seconds, which means that the operator has 3 seconds to position the work for the next weld. Total overall cycle is thus 9 seconds per weld. This scheme allows maximum output from the machine as the entire welding cycle then repeats automatically as long as the operator holds the foot pedal down.

"Precompression": Purpose of the initial precompression pressure and the preheating current is to bring the work pieces closely together even though they do not fit perfectly. This improves surface contact and thus prevents expulsion of molten metal which may occur at the beginning of current flow if full welding current is applied without this conditioning action.

As the surfaces come in perfect contact and the preheating current flows, the interfaces of the pieces to be welded are softened somewhat. At this point, the current is increased to the preset welding value and after a preset time lapse, the welding pressure is reduced.

Fig. 6 shows clearly the relation between pressure and current throughout a typical welding cycle. Note that simultaneous with interruption of the welding current, a high forging pressure is applied by the electrodes to hot work the weld metal, thus assuring sound weld metal and uniform high-strength welds.

Scaly Material: As mentioned previously, use of the proper variable-pressure variable-current cycle enables perfect welds to be made in pieces that may have considerable scale or rust on their

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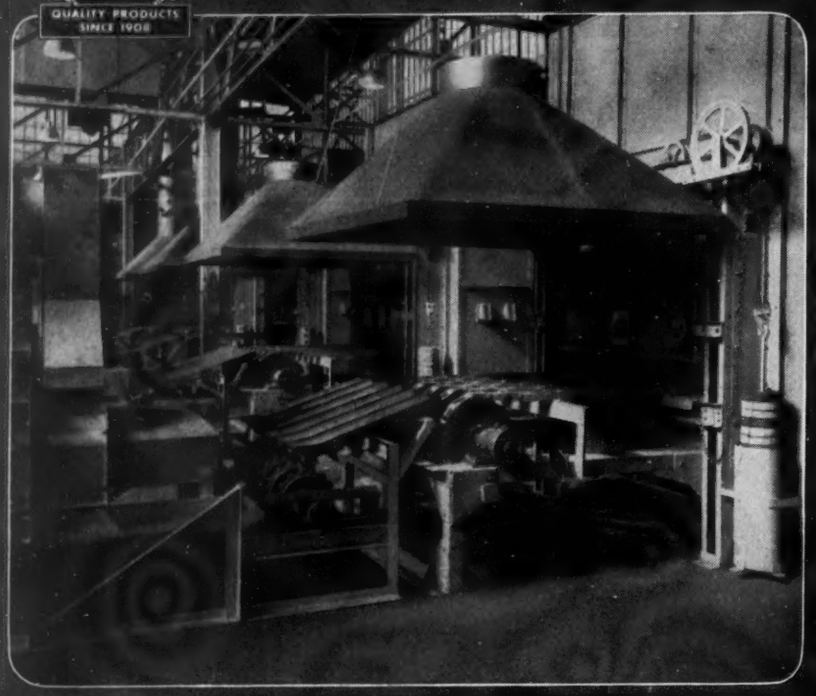

Illustration: Discharge ends of convection type draw furnaces where the heat treatment of heavy artillery shells is completed after the shells are hardened and quenched.

The continuous furnace is a production line machine which not only eliminates costly materials handling, but lends itself to accurate temperature control as well. Uniform physical properties are obtained in the process. Ductility and elongation are held to specified limits.

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surfaces. For such work, a very high initial electrode pressure is used to help break down the scale. This, combined with low initial current, establishes good electrical contact between the electrodes and between the two pieces to be joined so that subsequent welding current produces sound uniform welds, say Sciaky engineers.

In fact, it is not unusual to find two preheat currents employed as shown in the diagram, Fig. 6.

Sciaky engineers emphasize that the possibilities of variable-pressure variable-current welding and heating cycles have barely been touched. The examples given here serve to illustrate only a few of the important combinations.

Surfaces Inspected by Three-Dimensional Film

A new economical, speedy and simple method of surface inspection enlarges surface contours 100 diameters in three dimensions. The Faxfilm method, developed by R. W. McDill, 5109 Mayfield, Cleveland 21, is said to reproduce surface finishes of any material in third dimension for instant comparison with standards for roughness, waviness, and lay, and for checking surfaces for cleavage, cracks, porosity, dents, scratches, etc., by means of projection on any projector. Enlarged 10,000 times, or 100 diameters, the film is distinct and will show details of the finest irregularities up to 0.001-inch.

This process is suited for use in such fields as in quality control, sales, research, standardization, determination of bearing life and efficiency of lubrication. It has been used in metallurgy to determine grain flow and to prepare other data from etched specimens. Another important use is in the metal turning industry where samples of machined finishes must be compared for quality control. It is said to work equally well in determining the quality of fibers such as wood, cloth and paper.

Faxfilm is noninflammable and can be used with high powered projectors, and will withstand high heat without distortion, according to the manufacturer. At a small fraction of the cost of a photomicrograph, a complete three dimensional replica may be made in less than a minute by a few simple operations.

Cleated Shipping Box

Combining light weight and strength, a cleated box made by General Box Co., Chicago, may be used to pack an uneven product for shipping. Fiberboard material encloses the product with a dust-free covering to protect delicate parts. Wood cleats give the box strength to withstand stacking and shipping abuses. Container is shipped flat and partly assembled, saving storage space at the plant and making handling rapid and easy. Also, it may be unpacked without damage by removing a few nails.

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Metallurgical Practice

(*Continued from Page* 111)

with coarser interlocking graphite flakes.

Driving pinion and spline shaft assembly is of interest from the design as well as the metallurgical point of view. Rollers made from German steel VC-Mo 125 (similar to SAE 4125) are used as splines. These have been made from bar stock, carburized 0.020 inches and heat treated to a core hardness of rockwell C 37-39. Spline shaft and driving pinion is a low carbon manganese-chrome-molybdenum steel (EC-Mo 100) carburized and heat treated to a case and core hardness of rockwell C 62-63 and rockwell C 25-27, respectively. Use of helical gears is noteworthy. Rear axle shaft is made from a medium carbon chromium-molybdenum steel (German VC Mo 135) bar which had one end hot upset to fit into the universal joint. Shaft was gradiently quenched, obtaining hardness of rockwell C 28-34 on the shaft and rockwell C 45-48 on the tongue. It appears that the cooling rate was not rapid enough to obtain optimum hardening.

Magnesium Transmission Case — One of the most interesting nonferrous parts is the sand cast magnesium alloy transmission case. The use of magnesium for such purposes is uncommon in this country. The Germans apparently used it because of its ready availability and to contribute to the light weight of the vehicle. Casting was given a dichromate treatment to inhibit corrosion. Unusual soundness is evident. Other parts from magnesium are spacing washer for ring gear bearing and camshaft timing gear.

The aluminum alloy piston is also of interest. The composition is that of a German standard piston alloy, EC 124, designed for low thermal expansion and good heat conductivity. These pistons had been cast oversize and hot pressed and machined to size.

Bimetallic crankshaft and connecting rod bearings were made by casting 80-20 copper-lead alloy on low carbon steel backing. The lead globules were small and evenly distributed.

8-Ton Prime Mover—The German 8-ton half-track and personnel carrier, for which tabulated data are not shown, is one of the principal prime-movers of the German army, and because of its importance to mobile warfare, it has undoubtedly received special design and metallurgical engineering attention. (Germans designate half-tracks by their towing capacity.) This vehicle weighs 12.7 tons loaded, has a maximum road speed of 35 miles per hour and a highway range of 155 miles by using its full 50 gallon capacity. The vehicle is known as a half-track, although it actually has a track three quarters of the overall length. It is powered by a 6 cylinder liquid-cooled Nordbau engine developing 140 brake horsepower at 2600 revolutions per minute.

Many of the parts of this vehicle that were investigated are high stressed functioning parts and consequently there is a predominance of alloy steels. Phosphorus

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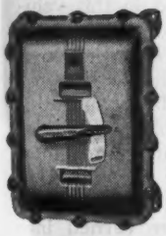
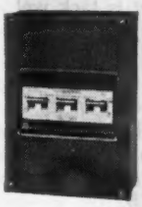


Weatherproof, Dust-tight and Explosion-Resisting Circuit Breakers are furnished in cast iron enclosures with gray enamel finish. Standard conduit openings in the ends. Capacities—15 to 600 amperes up to 575 Volts.



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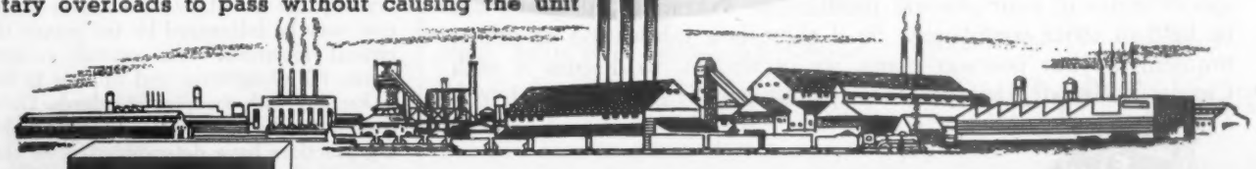

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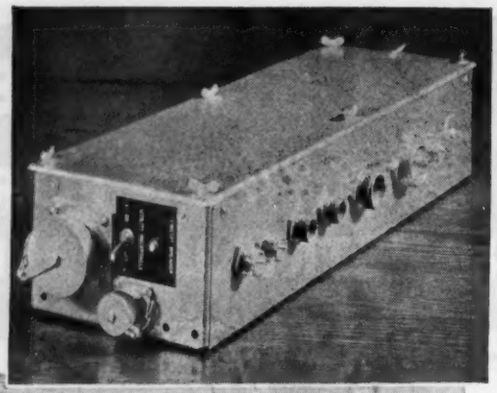

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and sulphur values compare favorably with U. S. practice. Residuals found in alloy grades are generally higher than are found in Volkswagen alloy parts and much higher than in the carbon steel parts of this vehicle.

Use Much Nickel—As in the Volkswagen, most of the alloy steels are of the chrome-manganese (VMC-140) and chrome-molybdenum (VCMO-140 and EC Mo 100) types. Contrary to the Volkswagen chemistries, several nickel alloys are used. Main shaft is made from Krupp analysis, and even though it is heavily loaded and highly stressed, they have apparently used higher alloy content than needed. The 4.45 per cent nickel is extravagant and compares favorably with German prewar conception of alloy steels. Outer race of the universal joint in this vehicle also contains high nickel, the analysis being comparable with SAE 3312. It would seem that this part also uses too much in the way of critical alloys and that a grade comparable with SAE 4315 or German AC Mo 100 would suffice.

It is evident that chromium is the principal alloying element in German alloy steels and usually is combined with manganese or molybdenum. Gear steels are chrome-manganese or chrome-molybdenum types, and contrary to the gear practices employed in the Volkswagen, low carbon carburizing grades are used. Table II consolidates the essential data on the gear practices used in this vehicle.

Crankshaft is made from chrome-molybdenum steel to which was added 0.50 per cent nickel. Macrographs indicate that a considerable amount of machining was done, but more noteworthy is the quality of the induction hardening of the bearing areas. Hardened zones have not been carried into the fillets. Also of interest is tack welding of a nitrided timing gear to crankshaft.

Ball and roller bearings that have been used in these vehicles conform to accepted standards. In each instance, the inner and outer races, and the balls or rollers were made from steels comparable with SAE or NE 52100 grades. Bearing assemblies have been marked as being made in Sweden, Italy and Germany.

Heavy-Duty Engine — The German heavy-duty engine and transmission are of more recent design and production, possibly late 1942. Consequently, they reflect later metallurgical practices, particularly the extent by which such practices may be influenced by the supply of critical materials. An overall review shows the phosphorus and sulphur to be in keeping with accepted standards. Data does not indicate that German steelmaking practices have deteriorated since the time of the manufacture of the Volkswagen. Apparently scrap segregation is strictly enforced. Residuals in alloy steels are slightly higher than in carbon grades, but the overall average will approximate 0.08 nickel, 0.07 chromium and 0.02 molybdenum.

As contrasted with the chemistries used

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in the Volkswagen and the half track, there has been almost complete elimination of ferroalloys critical to German supply. Chrome and manganese have been used to replace molybdenum. Nickel has entirely disappeared, except for one or two instances in nitriding steels. Hardenability requirements have been met by increased use of manganese, chromium and more drastic quenching in heat treatment. This is a complete reversal of their prewar thinking and shows the manner in which a difficult supply situation was handled. A review of the gear practice, Table IV, illustrates the swing to manganese-chrome steels.

Carburized Gears—The gear summary (Table IV) also shows that carburizing grades are used for all cased gears, conforming to practice used in the half-track but differing from that used in the Volkswagen. However, the gears were carburized rather deeply and quenched out to develop desired high core hardness values.

Crankshaft is rather large in diameter and operates at a speed of about 3000 revolutions per minute, which imposes heavy loads on the bearings and throws. The bearing areas have been induction hardened. Hardened areas are not as well controlled as in half-track crankshaft and quality would be considered marginal in this country. The crankshaft is made from essentially SAE 1345 steel with small additions of chromium (0.14 per cent) and vanadium (0.04 per cent).

Camshaft is made by forging bar steel of SAE 1015 analysis and carburizing all over to a depth of 0.035-inch after machining. An unusual type of processing is employed in making the camshaft gear. A cast medium carbon steel blank is partially hot pressed or forged at the tooth rim and machined to size. The gear is normalized after the forging operation, obtaining a hardness of rockwell C 22-27.

Cast Iron Pump Rotor—Water-pump rotor is of interest only because it is made from typical European white heart malleable iron. The low total carbon content (0.29) is obtained by packing white iron castings in iron ore at elevated temperatures for 2½ to 5 days. Only occasional fine graphite rosettes are found in the center portion of the part.

Solid intake valves are made from 0.43 carbon, low-nickel high-chromium steel which would be entirely satisfactory, but the 1½ per cent chromium is apparently higher than necessary. Exhaust valves are hollow and filled with sodium. They are made from silchrome type steel bars which are drilled and hot-upset, and after filling the hole in the valve head is sealed off with 18-8 weld metal.

Use Welded Shafts—The mainshaft is made from 0.30 carbon-manganese steel (SAE 1036) and the clutch gear from 0.44 carbon chrome-manganese steel forgings, and after machining all over, the two are welded to form an integral unit. Although complete penetration through the weld joint has not been obtained, it appears that weld area has sufficient strength to meet stress requirements. Welded areas have been ma-

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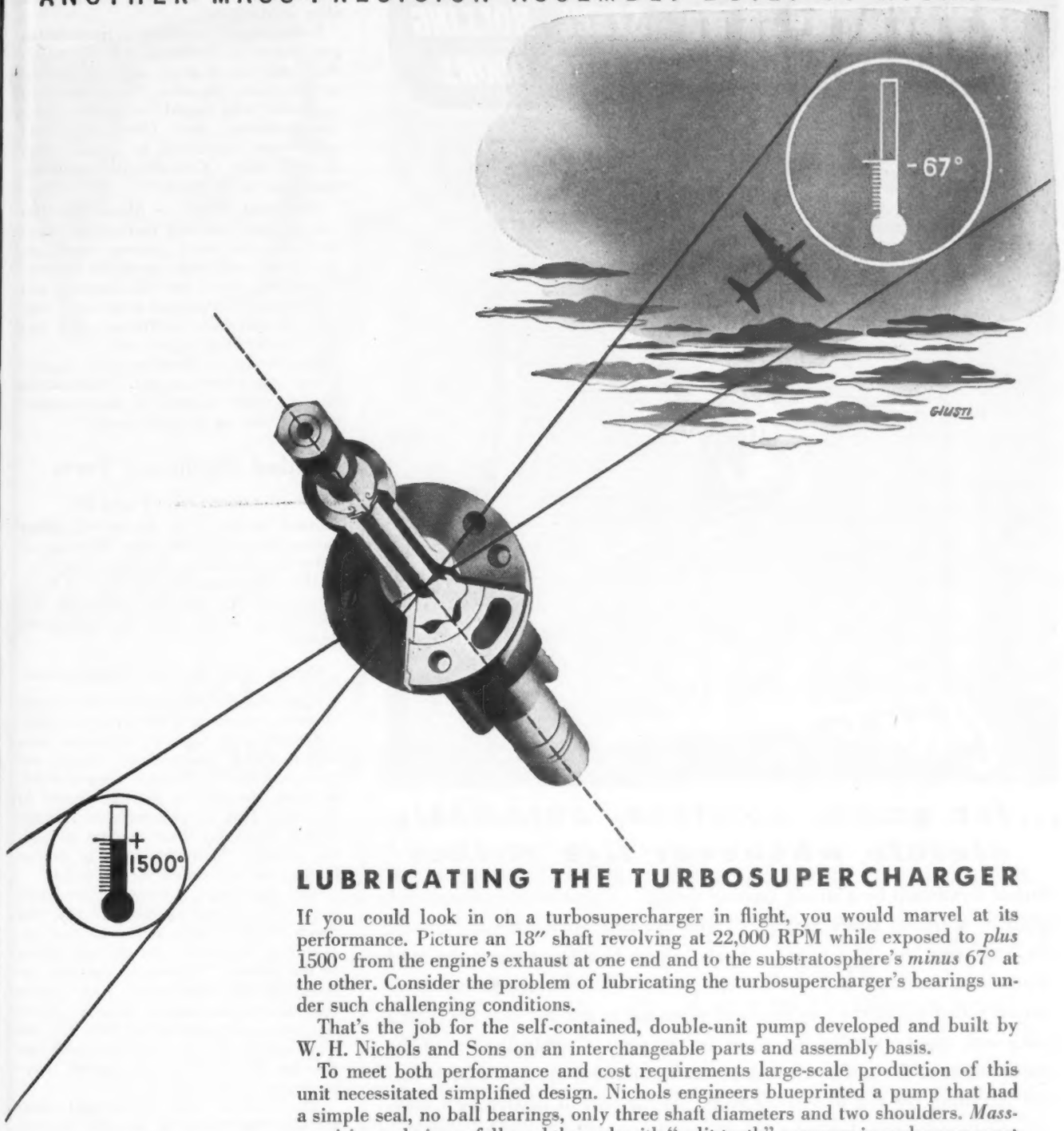

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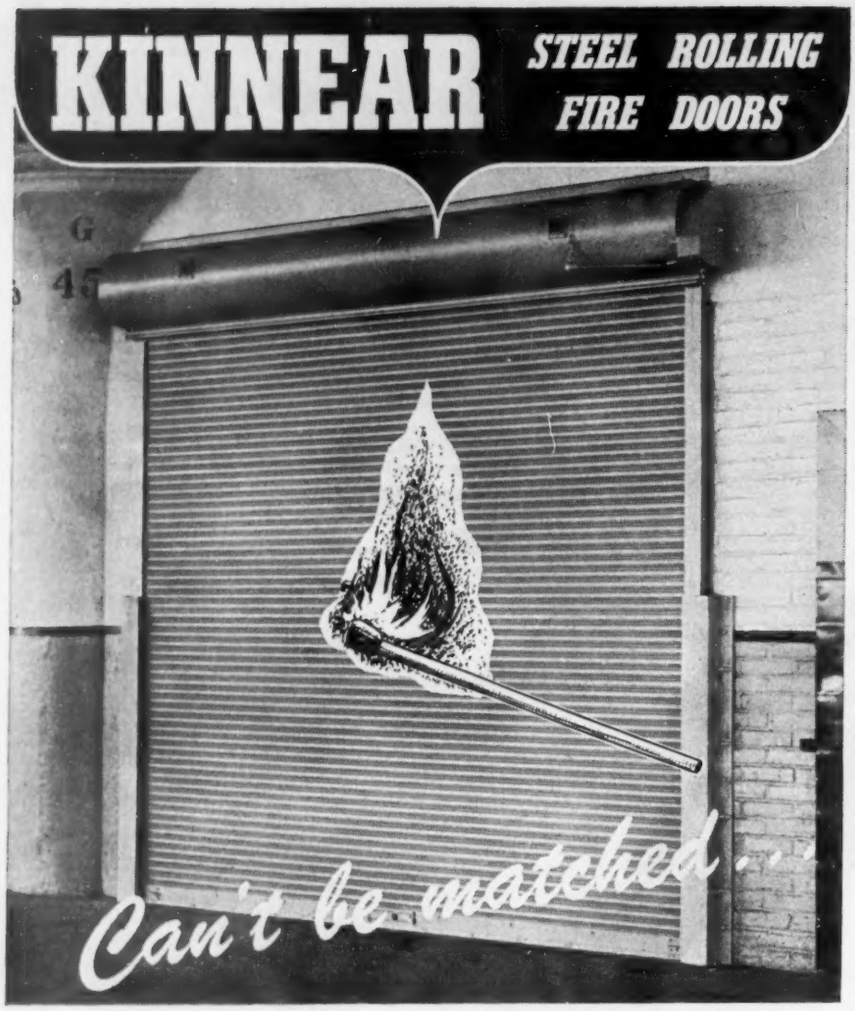

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chined and the assembly straightened after welding.

Bolted type of assembly in transmission gear differs from that used in the mainshaft and clutch gear, and the number of bolts seems excessive. Gear and shaft are made from forged low carbon manganese-chrome steel (Ger. EC 100) which were carburized to a case depth of 0.040 inch. Considerable machining was done on the blank.

Aluminum Blocks — Aluminum alloy (12 per cent silicon) castings are used for the engine block, pistons, crankcase, timing case and intake manifold. Aluminum alloy pistons are cast oversize and subsequently hot-pressed to grinding size. iron cylinder liner inserts are used and the cylinder head is also cast iron.

Copper and its alloys are used sparingly and only when essential. Applications consist largely of bushings and standard compositions are generally used.

Welded Machinery Parts

(*Continued from Page* 118)

railroad service. In wrecks of minor nature structural parts must be repaired either by rewelding or straightening.

This is an instance of the type of thing considered in selecting materials for weldments, many other considerations exist.

Design Criteria Also Fundamental

Naturally, the first of these is the type of service required of the structural part.

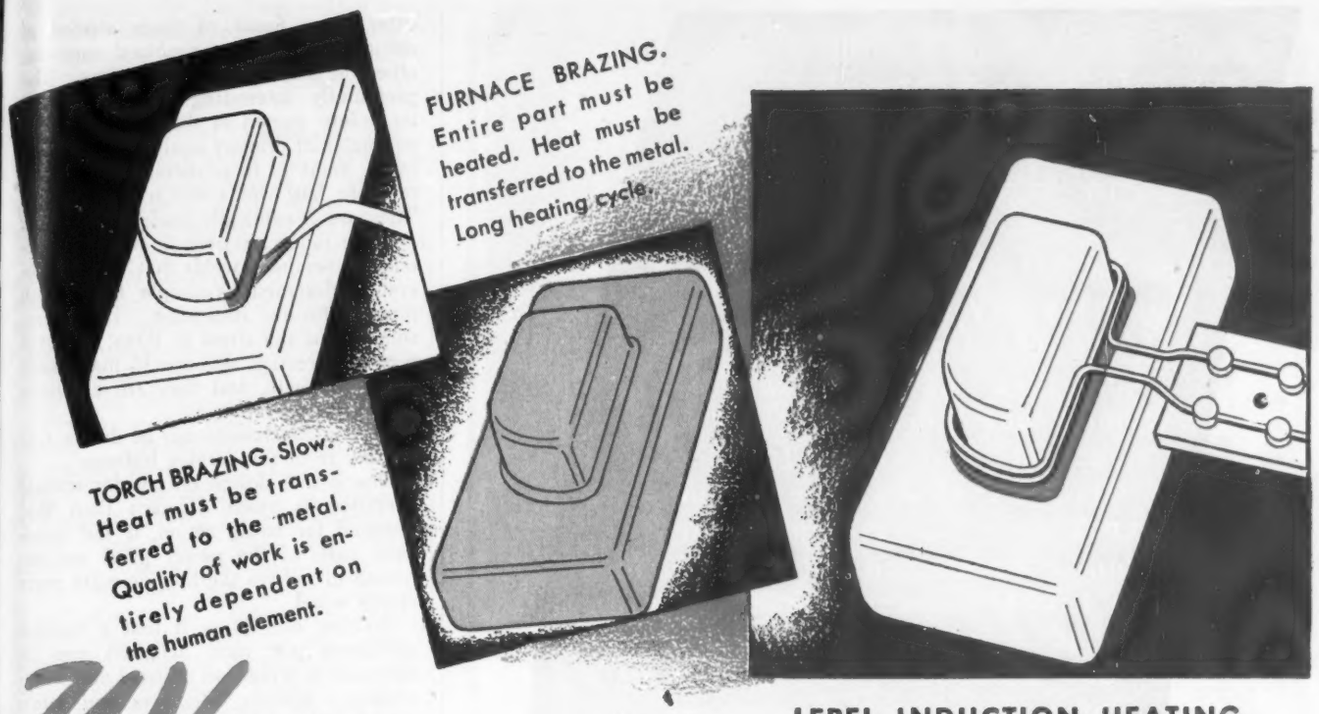
Several years ago a submarine was commissioned powered by diesel engines, the frames of which were of welded steel, similarly to the one shown in Fig. 10. This vessel completed roughly 10,000 hours on these engines in normal service. Many hundreds of similar frames are in constant service today.

This particular submarine, however, has a very interesting history. She was depth charged many times, on two occasions so drastically that she was blown to the surface. Ultimately the ship arrived on the West coast with known fractures in the engine frames. Some repair was executed at that time and she was then brought to the East coast under her own power for general overhauling.

The engines were dismantled completely, this permitting detailed inspection with the result that the engine frames were replaced since many more fractures were discovered. To broaden the knowledge of design criteria, one of these fractured frames was returned to the fabricator for careful investigation. Location, type, and possible causes of the fractures were studied and all surface cracks and every inch of weld metal were examined carefully.

Exactly 126 separate fractures were found—undoubtedly all occurred some time during combat or shortly thereafter, since they were noticed while the ship was still at sea — *nevertheless the ship traveled several thousand miles*, of necessity, following their discovery.

With reference to type and location, the cracks can be separated into a few


FURNACE BRAZING. Entire part must be heated. Heat must be transferred to the metal. Long heating cycle.
TORCH BRAZING. Slow. Heat must be transferred to the metal. Quality of work is entirely dependent on the human element.

LEPEL INDUCTION HEATING

Why LEPEL INDUCTION HEATING IS FASTEST, MOST ECONOMICAL, BEST FOR PRODUCTION METAL JOINING

Lepel Induction Heating, using load coils designed for the job, heats the entire area to be brazed at one time. It is so fast that the actual brazing operation is performed in a matter of seconds.

The heat is generated in the metal itself and concentrated within the area to be brazed; surrounding areas are not heated. Thus, discoloration is minimized, scaling is practically eliminated and little, if any, cleaning up or refinishing is necessary.

Temperature is automatically controlled; there can be no underheating, no "burning".

The human element is entirely eliminated; every job is uniformly perfect.

Metal joining, using brazing alloys of any melting point from lowest to highest, is a simple three-step operation when Lepel Induction Heating is used. Merely:

1. Pre-flux the parts to be joined.
2. Assemble the parts with the alloy preplaced in the form of rings, strips or irregular shapes to suit the job.
3. Apply the heat by means of the load coil.

Heating can be controlled manually or automatically and the work can be synchronized with other operations to provide continuous-flow production.

Lepel field engineers will be glad to study your metal-joining operations and offer practical suggestions for performing them more efficiently and economically with Lepel Induction Heating.

Lepel High Frequency INDUCTION HEATING UNITS

LEPEL HIGH FREQUENCY LABORATORIES, INC.

PIONEERS IN INDUCTION HEATING

General Offices: 39 West 60th Street, New York 23, N. Y.
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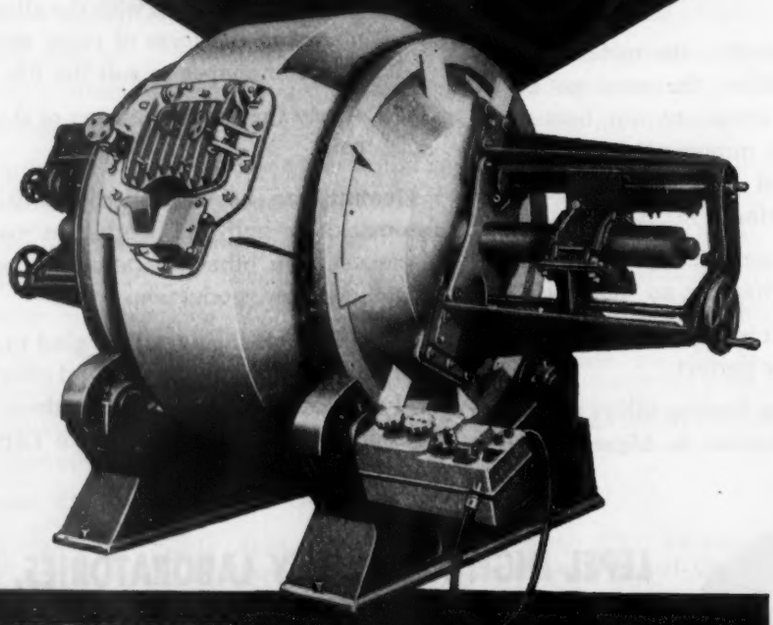
WHY A DETROIT ELECTRIC FURNACE IS AN INDISPENSABLE TOOL IN YOUR POSTWAR FOUNDRY

The Detroit Electric Furnace has many advantages which make it the ideal furnace for many foundries. It produces more pounds per man hour. It assures superior metallurgical results through precise control over time, temperature, and composition, resulting in a higher percentage of perfect castings. Further economies are assured by the direct use of salvage materials plus inherently lower metal melting losses. It produces as many as 8 ferrous or 16 non-ferrous heats in one 8-hour day with a minimum of dirt, fumes, and hard work. Detroit Electric Furnaces are available in sizes ranging from the 10 lb. laboratory model to 8,000 lbs. molten metal capacity.



DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

categories. Some of them started at stress raisers due to machined contours, others at contours about openings. The profoundly interesting finding is that no failure started in the welds, or parent metal, of primary load-carrying members. Some of these members have two or more butt welds within their length. They are dynamically loaded in tension.

Some failures started in welds of secondary members, welds that were deliberately designed as simple fillets with internal fissures remaining. It was assumed that the stress in them was of a type or direction that would make such joints adequate, and they are adequate for normal operation.

Certain conclusions can be drawn reasonably from this service history:

One is that design criteria for normal operation is much different than that required for battle action, if the structural parts of the power plant are expected to survive the hull or other parts of the vessel.

Another conclusion is that a welded machinery part most definitely can be designed to withstand unusual and indeterminate stresses. Members and joints intended to carry maximum normal stress survived drastic shocks perfectly.

Some of the fractures starting at other points crossed over welds in primary members which substantiates the conclusion that a welded joint can be so designed and executed that it need not be regarded as such. Otherwise you would expect the fracture to follow such a weld once it found it.

Finally the frame was sufficiently rigid and structurally stable so that the severe shock experienced still did not affect the operation of the engines. *They brought the ship home!*

Metal Must Be Disposed Properly: If properties of the material are to be utilized efficiently the metal throughout the structure must be disposed properly. Where minimum weight or maximum rigidity are of prime importance, metal must be disposed so that design loads are carried with the most uniform stress throughout or with the maximum moment of inertia possible.

Another point concerning proper disposition of metal is external contour. Flowing contours are natural to castings, the necessity being imposed by foundry requirements. They are necessary for another reason, too, in the structures of the type which we are discussing, because they provide relatively even stress levels; either designed or unpredictable. This logically is an absolute requirement for minimum weight and maximum serviceability.

Such design criteria cost money and there seems to be a natural tendency to just "weld" and hope for the best. Service records, however, substantiate our convictions on this score.

We have in Fig. 13 a typical sub-assembly as an example, with the welding on this completed as shown, accessible from the standpoint of both welding and inspection. Shrinkage and warpage have been eliminated as effects on the final assembly and the other portion of the

final structure also, has been welded under most accessible conditions. It has been inspected and controlled separately from the standpoint of shrinkage or warpage.

Trends in Types of Components: Definite trends emerge in the type and form of components being used in weldments. Trends are established naturally by economy and inherent design freedom.

It is quite evident from the examples given that hot rolled plate is the predominant component. Undoubtedly this is due mainly to freedom in design that two-dimensional plates allow, for almost any conceivable size or shape can be designed using plate as basic component.

Judicious use of other types of components in combination with plate provides added freedom and economy. The various methods of shaping or forming plate are utilized for the same reasons.

The most widely used plate component is, of course, the flame-cut shape.

Bent plates typified by those shown in Fig. 12 are used to advantage in many applications. The stiffening side members of this hydraulic press frame are of plate formed on the press brake. Their use in this typical instance reduces the welding required, provides initial stiffness or stability in the component, and adds to the appearance of the weldment.

The primary member of this frame is composed of two plates formed on the bending rolls and butt welded.

Welding Specifications Still Need Developing: There is no well defined trend as yet developing in specification of welded machinery parts, at least, none that I can see, except that progress has occurred in nomenclature. Weldments procured by or for government agencies, for instance, are clearly specified, and type, extent and control of inspection are fairly well developed. On the other hand, specifications on commercial welded machinery parts are too often pretty general and lean, and this causes discouraging delays in pricing and final design.

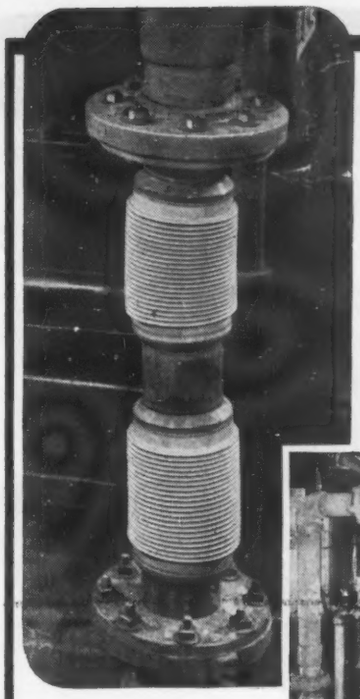
It would seem that valuable and important work can be done here by a coordinating agency since there is a splendid opportunity for the compilation and correlation of design criteria.

As mentioned, nomenclature is comparatively well developed and welding symbols are standardized. But items of specification on a welded machinery part are somewhat complex in contrast to those on a casting.

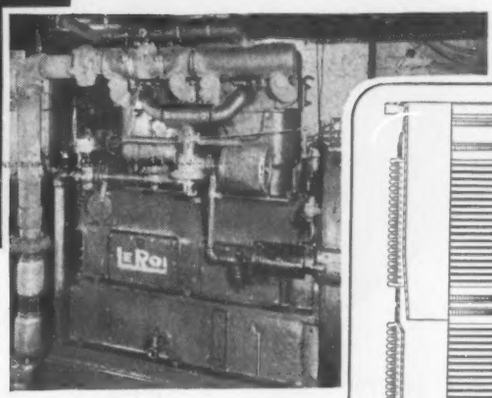
Today the codes and standards of many agencies overlap in the specification of welded machinery parts. It is reasonable to assume that none is adequate for they were established for other purposes.

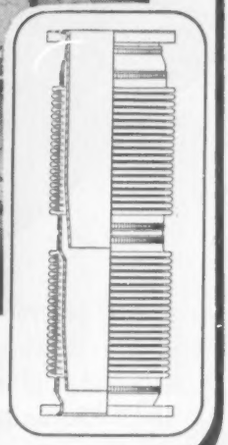
It is my conviction that the commercial designer literally has no guiding standards with the exception of nomenclature. It is inconceivable that he does not at times apply weldments in which faulty design endangers human life.

It has become common procedure for the user to rely on the supplier to develop his specifications for him, but there is nothing alarming in this if fundamental standards are available.



EXCESSIVE CORROSION + VIBRATION





demand

REX-FLEX Stainless Steel-lined exhaust units

Excessive heat, corrosion and vibration require an exhaust unit that is *durable*. Gas engines, especially, demand a Rex-Flex lined exhaust unit to best withstand these destructive forces.

A Rex-Flex *stainless-steel* unit was used in the above installation, since ordinary steel is more readily affected by corrosive action—caused by acidulated condensation during shut-down periods. Through the use of a lined Rex-Flex exhaust unit, a smooth bore flow was obtained—undesirable back pressures were avoided and longer unit life was assured. Flexibility was increased also, due to the Rex-Flex method of attaching the liner, which allows complete freedom of axial and radial motion within specified limits.

No matter what your exhaust connector needs are—now or in the future—you can increase operating life and efficiency with Rex-Flex Stainless-Steel lined exhaust units. Send your installation requirements to our Engineering Department—now.

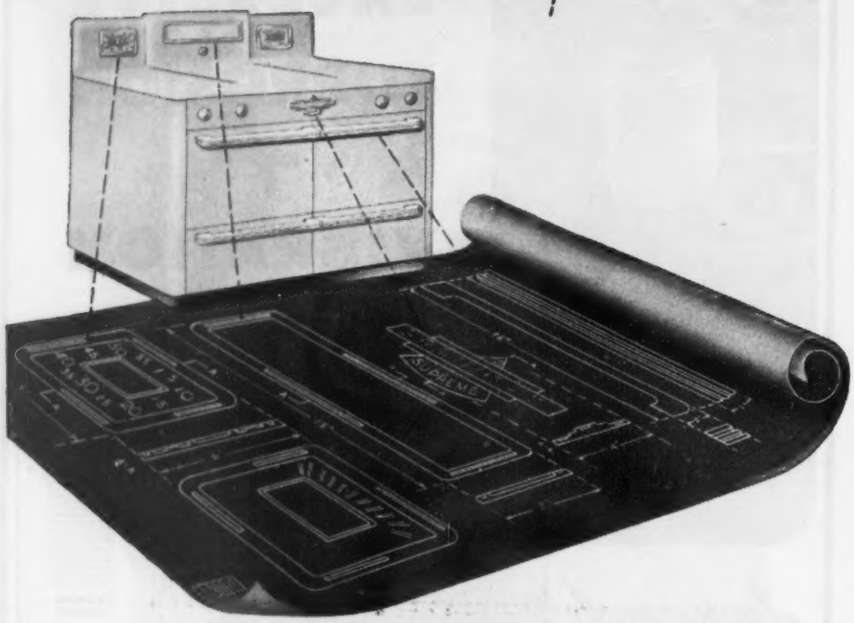
Flexible Metal Hose for Every Industrial Use

ARMY E NAVY

CHICAGO METAL HOSE CORPORATION
MAYWOOD, ILLINOIS

Plants: Maywood and Elgin, Ill.

Your POSTWAR METAL PRODUCT *designed and engineered NOW!*



Plan NOW to enlist the aid of GRAMMES Contract Service to develop ideas and blueprint your postwar metal product. The stove trim illustrated is but one of the recent achievements of our designers and engineers . . . other postwar product developments include several radio units, soft drink dispenser, new type snap locknut, parts for refrigerators, giftware, and other consumer and industrial products. These assignments indicate the versatility of our product development staff and how they have assisted others in accomplishing the desired end result.

Since 1875 GRAMMES has collaborated with manufacturing leaders . . . automobile, aviation, radio, refrigerator, and other key industries . . . in creating metal products of distinction. We are specialists in giving products the sales-creating features that flow from "above average" design and decorative beauty of color.

With two "E" awards, we're producing for Victory, but our Contract Service offers Research, Design, and Engineering aid NOW. Improved production techniques and increased plant facilities enable us to handle a few additional accounts requiring volume production for eventual postwar manufacturing.

GRAMMES FACILITIES INCLUDE

Stamping, Drawing, Spinning, Etching, Embossing, Lithographing, Enameling, Hard Enameling, Plating, Spraying, Wire Forming, Drilling, Welding, Machining, Heat Treating, Anodizing (Alumilite), Tools & Dies and Line Assembly.

Send for booklet describing "Contract Service by Grammes."

Two Awards
More Than a Billion Pieces of War Products

Grammes

MASTER CRAFTSMEN IN METAL . . . SINCE 1875

L. F. GRAMMES & SONS, INC., 102 Union St., ALLENTOWN, PA.

NEW YORK • CHICAGO • DETROIT • CLEVELAND • MILWAUKEE • PHILADELPHIA

Mullite Open-Hearth Roof

(*Concluded from Page* 128)

was laid up with magnesite cement. These installations never had a chance of success. One 13½-inch frontwall, which is still in the experimental stage, showed approximately 3 inches of erosion during the first 10 to 12 heats; after 70 heats, it has shown no further erosion. Indication is that this particular frontwall will give longer life than has been obtained in the past in this particular furnace.

Mullite is being used successfully in many applications in the steel industry. Average life of electric furnace roofs has been increased three times. Continuous pipe furnace campaigns have been extended from six to 26 weeks showing an increase of production of over 50 per cent. Detroit type of electric furnace shows an average life increased three times. Normalizing and forging furnaces have had their average life increased three to four times. Slag and taphole block for cupolas now stay in service for one complete heat, which never has been accomplished before. Burner blocks for innumerable applications give lower fuel consumption and better control of furnace due to uniformity of orifice, continuous furnace operations resulting in greater production because of fewer shutdowns for repairs. This type brick also is used in industrial boilers of all types, piers and arches, upsetting furnaces, etc.

Stainless Steel Lines Rusted Cooker

Contamination of materials cooked in a large steam jacketed cooker that was badly rusted was eliminated by installing a 16-gage stainless steel lining with electric arc welding and stainless steel electrodes. To insure a minimum loss of heat transfer, the lining was installed in 12-inch strips and tightly expanded against the inner face of the tank by means of two ¼-inch steel bands equipped with turnbuckles. These two steel bands clamped the 12-inch strips snugly to the wall of the cooker, and at the same time held them in place during welding of the joints. As each strip was installed, it was bonded to the inside of the tank by welding along the edges with ⅛-inch stainless steel electrodes. Each successive strip was installed in this manner, and any open spaces at the seams were then completely filled in with stainless steel electrodes.

The cooker has been back in service for some time, and contamination is said to be completely eliminated. While heat transfer rate has been decreased by approximately 20 per cent, it has not seriously hampered this process.

This method of relining was described by Randolph Mockbee in a letter received for the Hobart Arc Welding News Contest sponsored by Hobart Brothers Co., Hobart Square, Troy 1, O.

A LARGE manufacturer of automotive and aircraft parts reports these improvements in the heating for upsetting of aluminum propeller hub flanges for many of our fighters and bombers, including the B-29 Superfortress:

The former batch heating method—hot, dirty, cumbersome and non-uniform—required 2½ hours to heat the hubs. Total output averaged 45 per hour.

The 5-station TOCCO Induction Heating machine shown above—compact, clean, cool and accurate—heats 9″ of the 5¼″ diameter hubs to 800-850° F. uniformly throughout both length and cross-section. Every 47½ seconds, a prop is ready for the upsetter which is shown at the left of the TOCCO machine. Output of this one TOCCO unit averages 70 per hour . . . 55% faster than former method.

Find out how TOCCO can speed up your war production . . . improve your products and working conditions . . . cut your postwar costs. Write for free copy of "Results with TOCCO".

THE OHIO CRANKSHAFT COMPANY • Cleveland 1, Ohio

TOCCO

INDUCTION
HARDENING . . BRAZING
ANNEALING . . HEATING

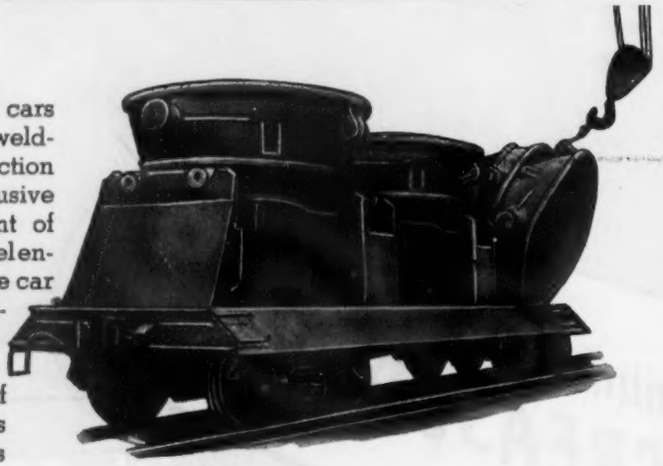
Steelcar

CINDER POT CARS

VARIOUS STYLES FOR YOUR WORK

THREE POT STYLE

Cinder pot cars of riveted welded construction are an exclusive development of Pressed Steel engineers. The car body, exclusive of pots and rings, is built up of rolled plates and shapes to form an exceptionally strong structure. Such cars are generally used for moving cinder pots from the open hearth pit to the skull crusher plant where the pots are generally dumped by means of the overhead crane rotating them on the car, but may also be lifted from the car and dumped.



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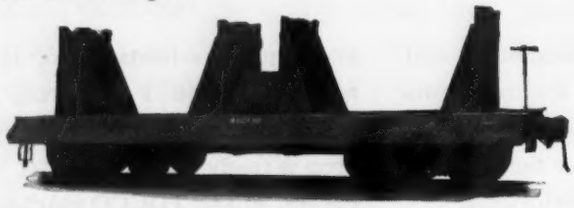
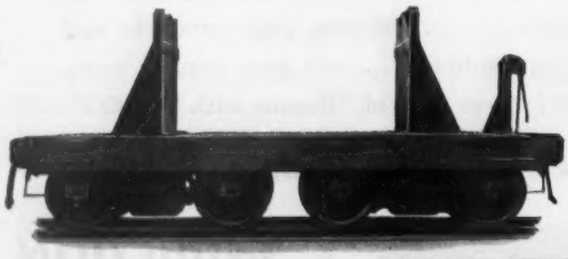
TWO POT STYLE



This type of car has been found to be ideal for this service and is furnished in sizes to accommodate one, two or three pots.



ONE POT STYLE

Descriptive Bulletin 72E on request

PRESSED STEEL CAR COMPANY, INC.
INDUSTRIAL DIVISION
PITTSBURGH, PA.

Salvaging Steel Scrap

(*Concluded from Page* 140)

a form profile piece to be brazed to a mild steel pad. Brazing, as a rule, is not advised for high-speed steel tools. Butt-welding may produce better results, as it entirely eliminates the base-line cracks that are so typical of brazing. As this particular type of tool does not lend itself to butt-welding, however, brazing is the only possible solution. In this instance, therefore, base-line cracks constitute a risk that must be taken as part of the operation.

The form profile piece is, of course, brazed and hardened at the same time, location being made by maintaining the bottom end of high-speed steel at right angles to the profile form. (See Figs. 1 to 4, inclusive.) The high-speed steel is set slightly above the mild steel face, to allow for canalure and light blends on either side.

In the same plant, about 2 inches of the copper band tools use are scrap, and it is found that, by altering the tool boxes, tool can be used up to a discard length of about half previous practice, i.e., approximately 1 x 1¼ inches.

Scrap Used as Tips

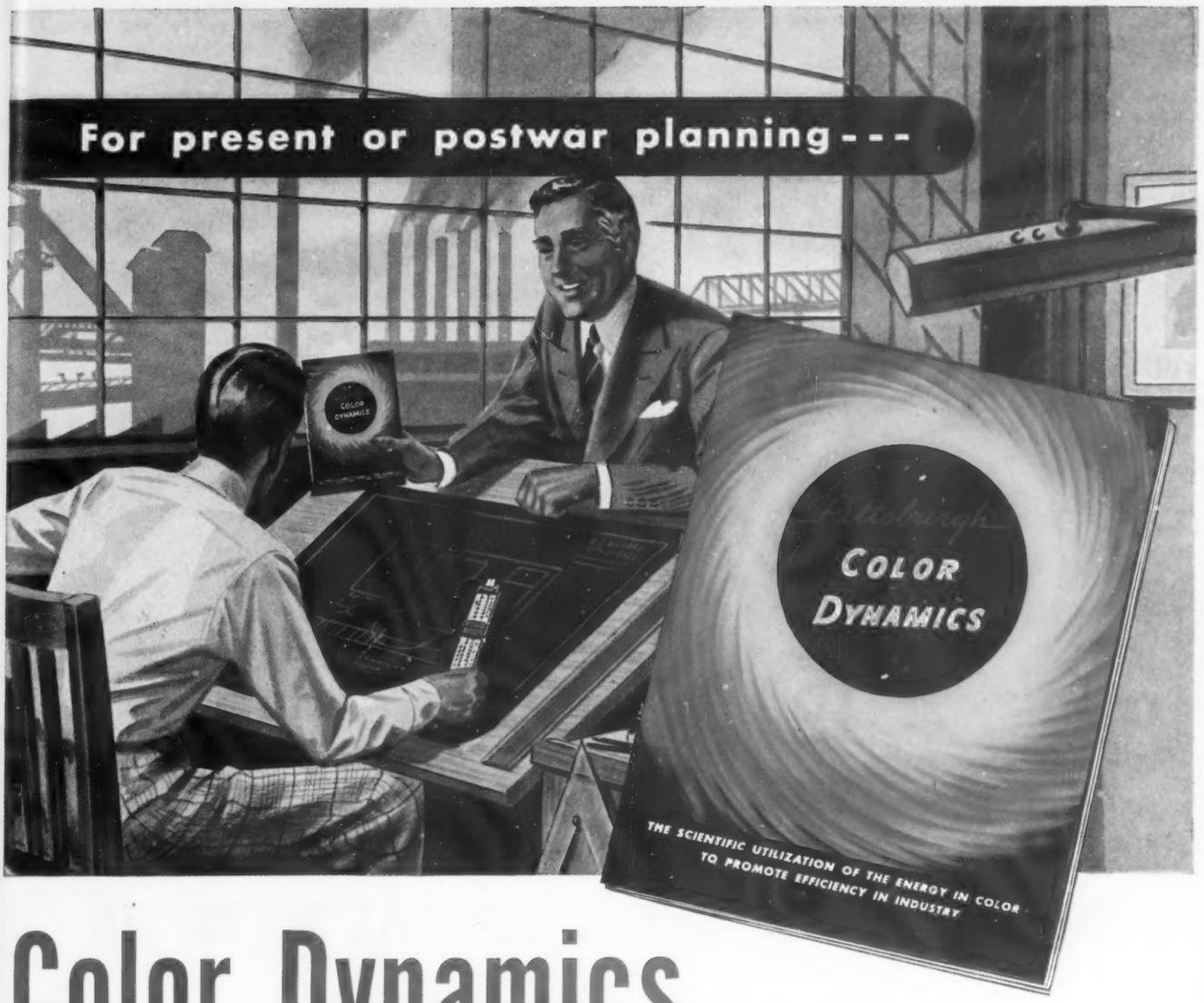
In another works, high-speed steel scrap is used as tips for cutting tools, again employing a brazing process. The design of tip found most effective is shown in Fig. 5. In this, a ledge approximately 1/32-inch wide is left all round to assist in preventing cracks that would be almost certain to develop if the tools were tipped as in Fig. 6. Moreover, the former yields a much more satisfactory braze.

In brazing small pieces of old tools of high-speed steel to carbon steel shanks trouble is sometimes experienced because the treatment is found to interfere with the condition of the high-speed steel. In such instances, it is safer to anneal the pieces before they are brazed on. Copper rather than bronze should be used for brazing, with borax as a flux. Pure copper melts at about 1080 degrees Cent. (1976 degrees Fahr.) but it is normal practice in Britain to braze and harden tools thus made by raising them to a temperature of 1380 degrees Cent. (2516 degrees Fahr.), as this does not appear to affect the joint in any way.

High-speed steel scrap has been made into teeth for slotting side and face cutters, which then are welded to the body of the tool. These cutters have successfully machined aluminum crankcase castings and similar work in Britain's war factories. This work is at present only emerging from the experimental stage, but it is believed that completely satisfactory composite cutters with teeth of salvage high speed steel will find widespread use in the near future.

—o—

A process for producing magnesium from Washington magnesite has been developed by the United States Bureau of Mines, Pullman, Wash.


For present or postwar planning - - -
COLOR DYNAMICS
THE SCIENTIFIC UTILIZATION OF THE ENERGY IN COLOR TO PROMOTE EFFICIENCY IN INDUSTRY

Color Dynamics . . .

A new system of using color to minimize workers' eye fatigue . . . to build up their morale and improve quality of production

FAR-SIGHTED executives in many industries are now making Pittsburgh's Color Dynamics an important part of their current operations as well as a major consideration in their reconversion plans.

They are becoming increasingly aware of the fact that eye fatigue often slows down production—even *more* than physical fatigue!

Eye fatigue leads to headaches, "nerves," digestive upsets, and depression—eventually to absenteeism and lowered production. Therefore, one important objective of Color Dynamics is to do away with the causes of eye fatigue.

1. Unnecessary eye travel is minimized by painting the critical parts of the machine in a focal color which focuses the attention of the workers exactly where it should be.

2. Tension is reduced by choosing a focal color which affords a clear contrast between the machine itself and the material being fabricated so that the worker does not have to strain to distinguish between the two.

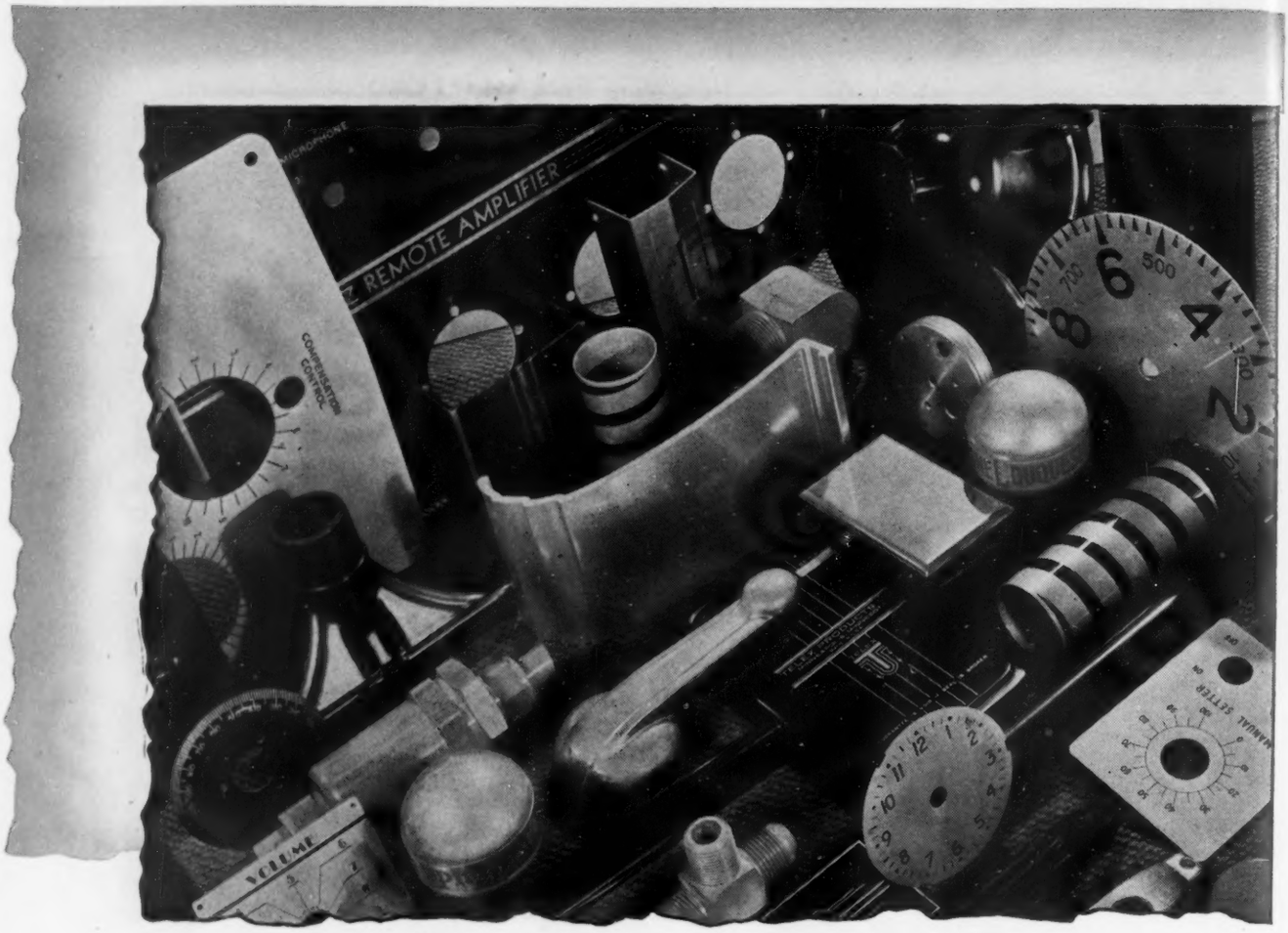
3. Constant adjusting is eliminated by painting walls in front of the machines in "eye rest" colors.

The practical value of Color Dynamics may be tested by applying these principles to one or two machines in your plant. For a comprehensive explanation of this new system of utilizing color-energy in industry, write for a free copy of our book, COLOR DYNAMICS, Pittsburgh Plate Glass Company, Paint Division, Dept. ST2, Pittsburgh 22, Pa.

PITTSBURGH PAINTS

PITTSBURGH PLATE GLASS COMPANY, PITTSBURGH, PA.

PITTSBURGH STANDS FOR QUALITY PAINT AND GLASS



BOOST THEIR SALES APPEAL WITH AN *Alumilite* Finish*

Your aluminum products can be given added sales appeal with an attractive, durable Alumilite finish. There are plain and colored finishes, bright and dull finishes. Used alone or in combinations, they produce striking and interesting effects.

The Alumilite process produces a dense, adherent coating of aluminum oxide, which is highly resistant to wear and corrosive attack. It adds to the usefulness and life of products. It keeps them looking young longer. Often, the Alumilite process simplifies and reduces the cost of finishing a product.

You may have the booklet, "Finishes for Aluminum", describing the many ways of finishing Alcoa Aluminum Alloys. For a copy, write ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh 19, Penna.

*Process patented

ALCOA FIRST IN ALUMINUM

Dollar Advance in Pig Iron Reflects Costs

OPA action follows price study. . . Steel buying less active but mills are full for months. . . Production recovers from low point

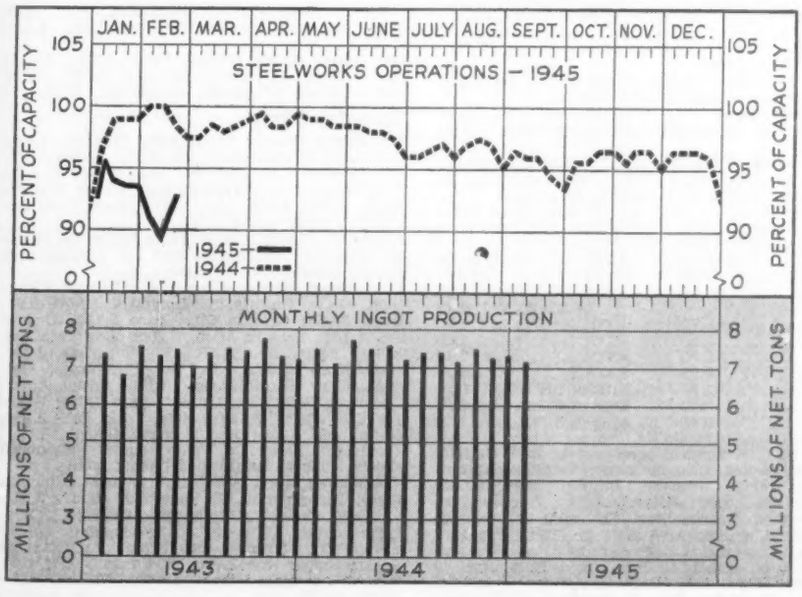
INCREASE of $1 per ton on all grades of pig iron, except charcoal, at all basing points, effective Feb. 14, announced last week by Office of Price Administration, reflects recognition of higher production costs and is taken as a forerunner of early general advances in steel and iron products.

A spokesman for OPA recently stated such increase is on the way and might be effective on some steel products before the end of February.

This is the first change in pig iron prices since the end of 1940 when producers added $1 to the prevailing prices of that year and these prices were frozen by the government June 24, 1941. While this higher price is a help to pig iron producers it does not represent a major portion of the actual increase in cost of making iron.

Steel orders continue heavy but the peak of the current buying movement appears to be over. Requirements for most of the important new programs have been covered for months in advance, with ordnance buying over the past 60 days heaviest for any comparable period since early 1943, when war machinery was first planned in volume. Demand now shows signs of tapering and this trend may continue for some time.

At the same time further heavy commitments are in sight, including large combat tank requirements and special types of ammunition and aircraft. Based on assurances by Washington that cutbacks following V-E day will be much smaller than previously expected, plenty of work appears ahead. Backlogs show little change, with extension of delivery dates in some products and easing in others. Better transportation conditions have aided movement of raw materials and finished steel in all lines.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Feb. 17	Change	Same Week 1944	Same Week 1943
Pittsburgh	84	+3.5	99	99
Chicago	99.5	None	101.5	101
Eastern Pa.	91	+4	94	95
Youngstown	89	+6	95	97
Wheeling	97.5	+9.5	92	80
Cleveland	86.5	None	93.5	92.5
Buffalo	90.5	+18.5	90.5	90.5
Birmingham	95	None	95	100
New England	90	—2	85	95
Cincinnati	96	+4	92	95
St. Louis	80	+5	82	91
Detroit	88	+1	91	93
Estimated national rate	93	+3.5	*98.5	*99.5

*Based on steelmaking capacities as of these dates.

Mainly a result of better weather conditions, the national steel rate last week advanced 3½ points to 93 per cent of capacity after the deep dip of the preceding two weeks. Pittsburgh advanced 3½ points to 84 per cent, Buffalo 18½ points to 90½, Wheeling 9½ points to 97½, Youngstown 6 points to 89, eastern Pennsylvania 4 points to 91, Cincinnati 4 points to 96, Detroit 1 point to 88 and St. Louis 5 points to 80 on an adjustment. New England was the only district to decline, dropping 2 points to 90. Chicago was unchanged at 99½, Birmingham at 95 and Cleveland at 86½.

Ingot production in January, at 7,178,315 net tons, was lowest for a 31-day month since July, 1942, and probably in percentage of capacity occupied lowest since July, 1940, when the defense program was just getting under way. It is estimated that new capacity figures as of Jan. 1, 1945, will indicate that January production was at about 88.5 per cent, compared with an average of 95.4 for all of 1944. Main factor in the low output was bad weather in a number of important production centers.

Extent of interference with steel production by weather conditions in January is reflected in shipments of finished steel by the United States Steel Corp. The January total of 1,569,115 net tons, was 198,485 tons less than in December and 161,672 tons less than in January, 1944. The tonnage was lowest for any month since June, 1943, and the smallest January figure since 1940. Average daily shipments were 58,115 tons, compared with 67,984 tons daily in December.

Steelmaking scrap situation has improved with better transportation performance, but the situation is not easy and material from reserves still is being used. Dealers continue to avoid undue accumulation, fearing a setback if the European war ends suddenly.

Advance of $1 per ton in pig iron prices has moved the average composite upward by the same amount, to $24.05. Other composites are unchanged, at ceiling levels, finished steel $57.55, semifinished steel $36 and steelmaking pig iron $19.17.

COMPOSITE MARKET AVERAGES

	Feb. 17	Feb. 10	Feb. 3	One Month Ago Jan., 1945	Three Months Ago Nov., 1944	One Year Ago Feb., 1944	Five Years Ago Feb., 1940
Finished Steel	$57.55	$57.55	$57.55	$57.22	$56.73	$56.73	$56.73
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Steelmaking Pig Iron	24.05	23.05	23.05	23.05	23.05	23.05	22.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	17.10

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	Feb. 17, 1945	Dec., 1944	Oct., 1944	Jan., 1944
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.20	2.15	2.10	2.10
Plates, Philadelphia	2.25	2.225	2.15	2.15
Plates, Chicago	2.20	2.15	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.15	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.65	3.60	3.50	3.50
Sheets, hot-rolled, Gary	2.20	2.15	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.65	3.60	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.80	2.70	2.55	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron	Feb. 17, 1945	Dec., 1944	Oct., 1944	Jan., 1944
Bessemer, del. Pittsburgh	$26.19	$25.19	$25.19	$25.19
Basic, Valley	24.50	23.50	23.50	23.50
Basic, eastern del. Philadelphia	26.34	25.34	25.34	25.34
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	24.69	24.69	24.69
No. 2 foundry, Chicago	25.00	24.00	24.00	24.00
Southern No. 2, Birmingham	21.38	20.38	20.38	20.38
Southern No. 2 del. Cincinnati	25.30	24.30	24.30	24.30
No. 2 fdry., del. Phila.	26.34	25.84	25.84	25.84
Malleable, Valley	25.00	24.00	24.00	24.00
Malleable, Chicago	25.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	37.34	37.34	37.34	37.34
Gray forge, del. Pittsburgh	25.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	140.33

Scrap				
Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$17.15	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	15.50	18.75
Heavy melting steel, Chicago	18.75	18.75	16.70	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke				
Connellsville, furnace, ovens	$7.00	$7.00	$7.00	$7.00
Connellsville, foundry ovens	7.75	7.75	7.75	7.75
Chicago, by-product fdry., del.	13.35	13.35	13.35	13.35

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to individual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.

(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill. Kaiser Co. Inc. $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop., $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34; Detroit, del. $36; Duluth (bil) $36; Pac. Ports, (bil) $46. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. Ports).

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, billets, $42; forg. bil. f.o.b. Pac. Ports, $52.

(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—$\frac{3}{8}$ in. inclusive, per 100 lbs., $2. Do., over $\frac{3}{8}$—$\frac{41}{64}$-in., incl., $2.15; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific Ports $0.50. (Pittsburgh Steel Co., $0.20 higher.)

Bars

Finished steel quoted in cents per pound.

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Calumet Steel Division, Borg Warner Corp., and Joslyn Mfg. & Supply Co. may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St. Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.

(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c.

(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c; double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, single ref., 5.00c, double ref., 6.25c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.20c; Granite City, base 2.30c; Detroit del. 2.30c; Eastern Mich. 2.35c; Phila. del. 2.37c; New York del. 2.44c; Pacific ports 2.75c.

(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, **base, 3.05c; Granite City, base** 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.65c; Granite City, base 3.75c; New York del. 3.89c; Phila. del. 3.82c; Pacific ports 4.20c.

(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh, 4.25c.

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.75c; Granite City, base 2.85c; Detroit, del. 2.85c; eastern, Mich. 2.90c; Pacific ports 3.40c; **20-gage;** Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.35c; Detroit del. 3.45c; eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets: 20 x 28 in., coating I.C. 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.20c; New York, del. 2.39c; Phila., del. 2.25c; St. Louis, 2.44c; Boston, del. 2.52-77c; Pacific ports, 2.75c; Gulf ports, 2.55c.

(Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. mill; Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b St. Louis. Geneva Steel Co., 3.25c, Pac. ports); Kaiser Co. Inc., 3.20c f.o.b. Los Angeles.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth),

Bright basic, bessemer wire 2.60c
Spring wire 3.20c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.80; galvanized, $2.55; Pac. ports ..... $3.30 and $3.05
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.40c
Woven fence, 15½ gage and heavier, per base column ..... .67c
Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Welded Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	...
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	.....
2¾"	12	17.54	20.21	16.58	26.57
3"	12	18.59	21.42	17.54	29.00
3½"	12	19.50	22.48	18.35	31.28
4"	11	24.63	28.37	23.15	39.81
4½"	10	30.54	35.20	28.66	49.90
5"	10	37.35	43.04	35.22	.....
6"	9	46.87	54.01	44.25	73.93
	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $43.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates, $43 net ton, base, Standard spikes, 3.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung	Chr.	Van.	Moly.	Pitts. base per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

STAINLESS CLAD STEEL (20%)

304	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller ..... 65½ off
Do., ⅝ and ⅝ x 6-in. and shorter ..... 63½ off
Do., ¾ to 1 x 6-in. and shorter ..... 61 off
1⅛ and larger, all lengths ..... 59 off
All diameters, over 6-in. long ..... 59 off
Tire bolts ..... 50 off
Step bolts ..... 56 off
Plow bolts ..... 65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
⅛-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller ..... 64 off
Milled 1-in., smaller ..... 60 off

Square Head Set Screws

Upset, 1-in., smaller ..... 71 off
Headless, ¼-in., larger ..... 60 off
No. 10, smaller ..... 70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural 3.75c
⅞-inch and under ..... 65-5 off
Wrought Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l. ....$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.00
Connellsville, foundry	7.50- 8.00
Connellsville, prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75
Wise county, furnace	6.75- 7.25

By-Product Foundry

Kearney, N. J., ovens	12.65
Chicago, outside delivered	12.60
Chicago, delivered	13.35
Terre Haute, delivered	13.10
Milwaukee, ovens	13.35
New England, delivered	14.25
St. Louis, delivered	†13.35
Birmingham, delivered	10.50
Indianapolis, delivered	13.10
Cincinnati, delivered	12.85
Cleveland, delivered	12.80
Buffalo, delivered	13.00
Detroit, delivered	13.35
Philadelphia, delivered	12.88

*Operators of hand-drawn ovens using trucked coal may charge $7.75, effective Nov. 29, 1943.
†13.85 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[16]	4.744[16]	4.144[11]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[16]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[13]	4.613[16]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[25]	4.072[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[18]	4.40[10]	3.75[21]	4.669	5.60[23]	5.75[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.65[21]	4.35	5.60[23]	5.75[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.75[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.65[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.75[21]	4.45[21]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.65[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[13]	4.500[24]	3.800[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[19]	5.443[24]	4.443[13]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	6.391[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[12]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[18]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[16]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.75[21]	4.65	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.887[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	3.98[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.361[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[15]	4.347[24]	4.031[21]	4.931	6.131[23]	6.231[23]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[15]	4.78[24]	4.33[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.54	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.60[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[3]	3.763[3]	4.313[3]	4.313[3]	5.313[26]	4.10[10]	3.65[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[12]	7.20[3]	5.583[20]	5.613	5.85[23]	5.95[23]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[18]	7.30[15]	5.333[21]	7.333	8.304[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[18]	6.60[15]	5.533[18]	.....	.....	.....
Tacoma	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[18]	7.60[18]	5.783[21]	.....	.....	8.00[23]
Seattle	4.35[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.95[18]	7.05[18]	5.783[21]	.....	.....	8.00[26]

*Basing point cities with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 18 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton, 51½% (Natural)

Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00

South African (Transvaal)

44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80

Brazilian—nominal

44% 2.5:1 lump	33.65
48% 3:1 lump	43.50

Rhodesian

45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50

Domestic (seller's nearest rail)

48% 3:1	52.80

less $7 freight allowance

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 248, effective as of May 15. Price at basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, at dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per GT	Electric furnace Bars per 100 lb.	Electric furnace Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.30	26.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.15	23.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.80	36.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00

Chemical Composition Limits, Per Cent

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	†21.38	†20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J., del.	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del.	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
§Pittsburgh, del. No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Steelton, Pa., base	.....	25.50	.....	26.50
Swedeland, Pa., base	26.00	25.50	27.00	26.50
Philadelphia, del.	26.84	26.34	.....	27.34
Toledo, O., base	25.00	24.50	25.50	25.00
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	26.94	26.44	27.44	26.94

Base grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. †For phosphorus 0.70% or over deduct 38 cents. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton; for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

5.00-6.50 per cent (base)	$30.50		
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furnace $34.00
Chicago, del. 37.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $24.50
Valley base 24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., $30.50 base; $31.74, del., Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co., (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $2 per ton, effective May 20, 1943. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942. E. & G. Brooke Co., Birdsboro, Pa., allowed $1 above basing point.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $66.55

First Quality

Pa., Ill., Md., Mo., Ky.	52.85
Alabama, Georgia	52.85
New Jersey	57.70
Ohio	46.35

Second Quality

Pa., Ill., Md., Mo., Ky.	47.90
Alabama, Georgia	39.15
New Jersey	50.50
Ohio	37.10

Malleable Bung Brick

All bases 61.65

Silica Brick

Pennsylvania	52.85
Joliet, E. Chicago	60.65
Birmingham, Ala.	52.85

Ladle Brick
(Pa., O., W. Va., Mo.)

Dry press	31.95
Wire cut	29.90

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net ton, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. (After Aug. 29 base price any grade $30.)

Ferroalloy Prices

Ferromanganese (standard) 78-82% c.l. gross ton, duty paid, eastern, central and western zones, $135; add $6 for packed c.l., $10 for ton, $13.50 less-ton; f.o.b. cars, New Orleans, $1.70 for each 1%, or fraction contained manganese over 82% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium Carbon); per lb. contained manganese; eastern zone, low carbon, bulk, c.l., 23c 2000 lb. to c.l., 23.40c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 23.30c; 2000 lb. to c.l., 24.40c; medium, 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c, 2000 lb. to c.l., 25.40c; medium, 15.75c and 17.20c; f.o.b. shipping point, freight allowed.

Spiegeleisen: 19-21% carlots per gross ton, Palmerton, Pa. $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, max. .50% carbon, eastern zone, per lb. contained chromium bulk, c.l., 79.50c, 2000 lb. to c.l. 80c; central, 81c and 82.50c; western, 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R.R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome: Add 5c to all high carbon ferrochrome prices; all zones; **low carbon** eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65c for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. to c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom. 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed, 14.45c ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil. 4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium; 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed; 12.00c. 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

CMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

CMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western, spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% Max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central: $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max., sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract, ton lots, $1.89, less, $2.01, eastern, freight allowed; $1.903 and $2.023 central, $1.935 and $2.055 western, spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum. 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max., sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate, to which equivalent of St. Louis rate will be allowed; spot, up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide, approx. 10% and calcium oxide approx. 2%, or Red Cake: Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed, per pound vanadium oxide contained; contract, carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; cast: Contract, ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309, Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20%, mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.), per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c, eastern, freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c, 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western, 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 c.l., 35c; central, 34.25c and 36c; western, 34.55c and 38.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99% per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40; eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15%, net ton to carload, 8c lb. F.O.B. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferrotitanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern, contract, carlots, bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75; ton lots 6.50c. Spot ¼ cent higher.

Simanal: (Approx. 20% each Si., Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page 156 of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Bundles	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Machine Shop Turnings	13.75
Mixed Borings, Turnings	13.75
Shoveling Turnings	15.75
No. 2 Busheling	15.50
Billet, Forge Crops	21.25
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turning	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	11.50-12.00
Short Shovel Turnings	13.50-14.00
Mixed Borings, Turnings	11.50-12.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	15.50
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06•
No. 2 Heavy Melt. Steel	14.06•
No. 1 Bundles	14.06•
No. 2 Bundles	14.06•
No. 1 Busheling	14.06•
Machine Shop Turnings	9.06
Mixed Borings, Turnings	9.06
Short Shovel, Turnings	11.06•
Chemical Borings	13.06•
Low Phos. Clippings	16.56•
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

•Inland base ceiling; Boston switching district price 99 cents higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Mach. Shop Turnings	15.00
Short Shovel, Turnings	17.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	21.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	13.00
Cast Iron Borings	16.00
Machine Shop Turnings	14.00-15.00
Low Phos. Plate	21.00-22.00

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	11.00-12.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet, Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails, Random	18.50
Rerolling Rails	20.50
Angle, Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy. Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
No. 3 Galv. Bundles	16.75
Mix. Borings, Sht. Turn.	9.50-10.00
Machine Turnings	9.50-10.00
Short Shovel Turnings	10.50-11.00
Cast Iron Borings	10.50-11.00
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel. Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	13.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	9.00- 9.50
Cast Iron Borings	10.00-10.50
Short Turnings	11.00-11.50
Low Phos Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	13.50-14.00

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	$17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	9.00- 9.50
Rerolling Rails	21.00
Steel Car Axles	21.50-22.00
Steel Rails, 3 ft.	21.50
Steel Angle Bars	21.00
Cast Iron Wheels	20.00
No. 1 Machinery Cast	20.00
Railroad Malleable	22.00
Breakable Cast	16.50
Stove Plate	18.00
Grate Bars	15.25
Brake Shoes	15.25

(Cast grades f.o.b. shipping point)

Stove Plate	18.00

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.50
No. 2 Heavy Melt. Steel	18.50
No. 1 Comp. Bundles	18.50
No. 2 Comp. Bundles	18.50
Machine Turnings	7.50- 8.00
Shoveling Turnings	9.50-10.00
Cast Iron Borings	9.50-10.00
Mixed Borings, Turnings	8.50- 9.00
No. 1 Cupola Cast	20.00
Breakable Cast	16.50
Low Phosphorus	21.00-21.50
Scrap Rails	20.50-21.00
Stove Plate	16.00-16.50

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$14.00
No. 2 Heavy Melt. Steel	13.00
No. 1, 2 Deal. Bundles	12.00
Machine Turnings	4.50
Mixed Borings, Turnings	4.00
No. 1 Cast	20.00

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$15.50
No. 2 Heavy Melt. Steel	14.50
No. 1 Busheling	15.50
No. 1, No. 2 Bundles	13.50
No. 3 Bundles	9.00
Machine Turnings	6.90
Billet, Forge Crops	15.50
Bar Crops, Plate	15.50
Cast Steel	15.50
Cut Structural, Plate, 1", under	18.00
Alloy-free Turnings	7.50
Tin Can Bundles	14.50
No. 2 Steel Wheels	16.00
Iron, Steel Axles	23.00
No. 2 Cast Steel	15.00
Uncut Frogs, Switches	16.00
Scrap Rails	16.00
Locomotive Tires	16.00

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 15.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low-grade piston alloy (No. 122 type) 10.50c; No. 12 foundry alloy (No. 2 grade) 10.50c; chemical warfare service ingot (92½% plus) 10.00c; steel deoxidizers in notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 9.75c, Grade 3 (90-92%) 8.50c to 8.75c, Grade 4 (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, Nos. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 11, 13X, 17X, 25.00c; ASTM B107-41T, or B-90-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 18X, 25.00c. Selected magnesium crystals, crowns, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. 51.62½c; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American, bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 14.50c; 99.8% and over (arsenic, 0.05%, max. and other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload to 10,000 lb.; ½c for 9999-224-lb.; and 2c for 223 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: OPA ceiling prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz., $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193. Open market, spot, New York, nominal for 50 to 100 flasks; $165 to $175 in smaller quantities.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze			
90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more; New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½ copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 170

Sheet demand in general continues heavy, though some consumers have left the market because of the sold-up condition of mills, making delivery promises too far advanced. Some directives are being employed, though not to a great extent. Mills whose shipments have been delayed by snow are trying to move accumulations to consumers. Carbon sheet promises now range from August into October, some producers being filled for third quarter. Galvanized promises extend from September through the year.

New York—Sheet buying here, while still far from slow, is somewhat less active. This is ascribed in part to unusually heavy buying of the past few weeks and to the fact that deliveries have now become extended to a point where consumers are not in a position to provide specifications. On the other hand, where definite contracts have been received extending well in the future there is still pressure to obtain coverage, as cancellation clauses would become operative in the event of some later switch or cut in a program.

Directive tonnage placed here is not large, and most appears to result from delays on highly critical work because of severe weather and traffic conditions.

Hot and cold-rolled sheet deliveries now run from August into the early part of fourth quarter. Some producers are now practically out of the market on either grade for third quarter. The situation in galvanized ranges generally from September through December.

Cincinnati—Mills in this district are trying to catch up on sheet deliveries, which were slowed by embargoes, trucking difficulties and other recent handicaps. Heavy tonnage was stocked awaiting transportation facilities. Tightness was further augmented by steady demand, which pushed delivery promises on most sheets into September. Backlog on long ternes was not so extended.

St. Louis—Demand has continued at the high level set in December following the Belgian bulge, with 100 per cent of production allocated by WPB. Schedules are filled from August to November and there is no present sign of relief. Strip steel remains in strong demand with some plants booked to November. In recent weeks there has been no appreciable drop in the heavy demand.

Philadelphia — While sheet inquiry is a shade less active, several important tonnages are being featured, including more than 4000 tons of 24-gage hot-rolled pickled sheets for prefabricated hospital units. As early delivery is specified directives will be necessary if schedule is not to be delayed. Most producers are booked well into third quarter on hot and cold-rolled sheets and some have nothing before fourth quarter. Galvanized sheet schedules range from August into next year, at least two producers having nothing to offer before February. Due to highly sustained requirements, particularly from the Signal Corps, deliveries on silicon sheets are more extended. One producer is sold up until September. Stainless sheets are being quoted for shipment in late May and June but a new program is shaping up which may extend deliveries materially.

Pittsburgh — The heavy volume of sheet buying by the armed forces in recent weeks has built up a tremendous backlog and it now appears no further bookings will be available over the balance of this year in most products. Some exceptions are in heavy hot-rolled sheets and in narrow strip, both hot and cold. There is also a good possibility that heavy tonnages will be placed through Lend-Lease for rehabilitation work in Europe after the fall of Germany, and in fact some tonnage has already reached the inquiry stage for this purpose. This seems to indicate little possibility of additional sheet tonnage for reconversion purposes this year, and mills here see little chance of wholesale cancellations in tonnage now on the books.

Cleveland—Flood of steel order directives following substantially larger war requirements has badly disorganized mill books and threatens to force a breakdown in CMP procedure of steel distribution. Production schedules are reported temporarily frozen to permit a re-examination. Those seeking new directives to meet sharply expanded war output have failed to get action recently. Carryover on sheets and plates now represent 2 to 4 weeks output. Exceptionally heavy requirements for galvanized sheets have developed.

Boston—Little or no abatement in new narrow cold strip volume is noted. While some mills have openings for late second quarter, more sizes and grades are in August. Alloy demand is brisk, considerable for transmission chain. Sheet buying has subsided from the recent wave of buying, notably for ordnance components, although still heavy. Electrical sheet volume is well above normal, as is the case in stainless.

Chicago — Extended deliveries on sheets are expected to cause considerable hardship in coming weeks, as war contractors find themselves obliged to make delivery of their products but unable to obtain steel early enough. Although the government is using directives to an increasing extent, it is not likely many contractors will be able to get directives when confronted with the foregoing predicament. Through certain readjustments, one district sheetmaker has improved its position on hot-rolled pickled sheets. Deliveries are moved up from October to August.

Steel Bars . . .

Bar Prices, Page 170

Bolstered by the enlarged shell program, larger needs for gun components and miscellaneous demands arising from war needs steel bar deliveries are being pushed further into the future. Delivery promises now extend into third quarter and beyond, some producers being booked full to October. Deliveries for the shell program are numerous and are expected to increase.

Boston — Except for heavy chain in some instances, there is no slackening in normal demand for carbon and alloy bars and requirements of some fabricators have increased. Thus large orders for shell steel, mostly on directives, supplement an already mounting volume. Deliveries will be heavier next month, starting with a Maine shop to fabricate 60-mm. mortar shell, and will be progressively greater into June at least. Alloy orders are moving more grades and sizes into June delivery; increased inquiry for alloys is second only to that for hot-topped carbon shell steel. In this aircraft has contributed, but also small arms, forge shops, bolt and nut specialties. Quoting on a large navy inquiry for marine hardware, wire rope hooks, rigging screws and shackles, a Maine shop offers shipments to start one month after receipt of steel. Frequently fabricators are making shipping promises on basis of steel deliveries.

New York — Bar backlogs continue to mount, with relatively little available before third quarter and with some producers practically booked up for that period on larger sizes. Electric furnace alloy bars can be had in May, although open-hearth alloy deliveries are now quoted for July and August.

Shell work and gun components still dominate demand, although substantial tonnages are coming from a diversity of sources, from bolt and nut makers, manufacturers of marine hardware, railroad equipment builders, ship yards and the aircraft industry, which latter is still pressing for alloy bars primarily.

Additional tonnage also is being figured for new combat tank and mobile gun carriages. Two large eastern railroad equipment builders are understood to have recently taken considerable more work of this character.

St. Louis—Demand for merchant bars continues heavy, with a noticeable increase over last week. Some makers decline to set or estimate delivery dates. Concrete bar deliveries are becoming easier as war plant construction tapers.

Cleveland — Unusually heavy demand for alloy steel bars continues with active buying noted from aircraft engine plants and parts manufacturers. Lack of manpower and components, however, continue to hold down consumption of both carbon and alloy steel bars in the machine tool, farm implement and railroad equipment industries. The heavy shell program is by far the largest consumer of bar stock and as expansion of shell loading plants are completed more billet steel will be channeled into this program. Mill deliveries on large rounds are extended into October, with July earliest available on smaller sizes. Alloy bar orders are scheduled for late August shipment.

Philadelphia — Bar specifications have eased, although the market remains active, especially in cold-drawn bars for fuzes and rockets. On cold-drawn bars in sizes from 2¼ to 5¼ inches deliveries extend well into third quarter and in a few instances even beyond. Hot-rolled carbon bars still can be had in second quarter in small diameters but most tonnage falls in third quarter.

Chicago — Carryover of bar tonnage at the beginning of February was in some instances the heaviest for any month during the war period, and reflected the impact of the shell program. Stepup in production of all war goods places bars in a tight position in their own right. Forgers, who 12 months ago were carrying considerable stocks, have in recent months had their inventories reduced to the point where they no longer constitute an end of the war hazard. In some instances, stocks are too low to make top operations possible.

Steel Plates . . .

Plate Prices, Page 171

In spite of lessened demand for plates, compared with heavy tonnages in the past year or two, production is expected to remain high through first half as shipbuilding needs continue. Recent plac-

ing of a large number of locomotives for export, with others now pending, will provide considerable tonnage of plates also.

Philadelphia — March is expected to see the peak of Maritime Commission plate requirements, with a decline after that. Miscellaneous tonnage needs appear somewhat lighter at present. One producer still has some sheared plate available for April shipment, with most others in May and June. Foreign locomotive requirements will bolster second quarter schedules and beyond. The 1200 locomotives now on order for France and Russia are expectetd to be increased within the next few weeks by placing of 300 for Belgium. Requirements for wheels for the French units are already on inquiry.

Cleveland — Output of plates here has gained substantially, reflecting increased pressure for Maritime Commission requirements and the upturn in rate operations at Republic Steel Corp.'s converted strip mill. Considerable plate tonnage is going into ship repair work and locomotive and tank production.

New York—Plate buying here continues at the high rate developed in January, when several sellers experienced the best business in a number of months. There has been relatively little tank work, which normally is an important item, but there has been much new buying by shipyards and railroads in particular, and by jobbers who report difficulty keeping stocks in balance. The latter situation has been due in part to delays in shipments from mills because of weather and transportation; however, demand has been particularly pressing from consumers, who also have been experiencing delays in shipments from mills.

Boston—Slackening demand for plates will be partially offset at two shipyards by shell steel requirements. Except for fill-in tonnage, two other yards have orders at mills for completion of current contracts; employment is tapering and inventories are combed where possible. Yards building Navy ships, destroyers and heavier, are confronted with less curtailment in programs, but on the whole are placing plate tonnage more conservatively. Curtailment has been greatest in small boats, including landing craft. Repairs to the latter have developed some inquiry for prompt shipment, filled mainly by warehouses. Structural fabricating shops, in need of replacements for completed ship subcontracts, are taking smallest tonnage in three years; requirements for flame-cutting reflect the trend, but to less degree. Decline in demand for ships is not made up in other directions. Slack in floor plates, is slightly accelerated. Launched at the Cramp yards, Philadelphia, in August, 1943 and towed to Boston navy yard in May, 1944, the first submarine completed here was commissioned last week. Priority for landing craft and destroyer escorts delayed completion earlier, but with pressure off for light ships, another submarine is going ahead at Boston.

St. Louis — The increased shipbuilding program of the Maritime Commission has earmarked plate capacity to that purpose practically 100 per cent, the only exceptions being rare WPB directives for civilian projects. Orders already booked will extend to June or July, as compared to the June predicted before the new ship work appeared.

Chicago — Product mix, or short-run orders, are of more concern to platemakers now than total load. Total business is declining, but while through the last two years orders were for considerable tonnages of one size, many now involve small tonnages of various thicknesses and sizes. This results in lower output per turn and higher costs. From all indications, Maritime Commission plate load for second quarter will be 10 to 15 per cent below first quarter, and from this point on product mix will be on an ascending scale.

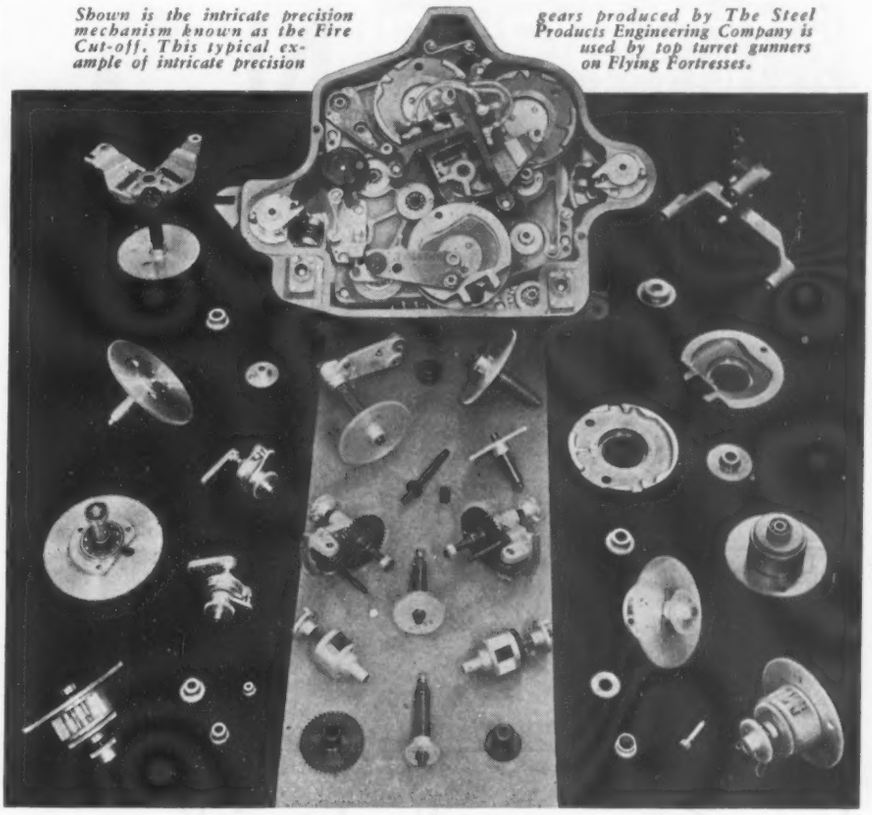
Wire . . .

Wire Prices, Page 171

New York — One of the tightest spots in wire processing, galvanizing, is being farmed out under subcontracts to expedite delivery on urgent war material, including tire bead wire. Hose wire for refueling lines, for which demand is substantial, is being copper-finished in large volume instead of galvanized. Some mills are booked through the year on galvanized. There is no decline in heavy volume of orders for war programs. Directives apply to a relatively large proportion, some being of continuing type, displacing more CMP tonnage and increasing carryover. Concentration of large urgent tonnages in the same size ranges is a choke point in drawing operations. For springs backlogs are heavy and music wire is well into third quarter on some sizes.

Boston — Numerous directives, some supplemental, moving forward deliveries,

Shown is the intricate precision mechanism known as the Fire Cut-off. This typical example of intricate precision gears produced by The Steel Products Engineering Company is used by top turret gunners on Flying Fortresses.



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The Steel Products Engineering Company has complete facilities, including the men, the skill and the equipment to generate precision gears in quantity for the needs of war or peace. Using the most modern equipment through to Gleason Universal Gear Testers and involute checkers, our facilities are available for quantity gear production as well as for special or custom-built jobs or equipment.

We are equipped to generate spur gears from 3 diametral pitch, and 42" diameter, on down; straight bevel gears, to maximum of 12" diameter; helical gears; worm and worm wheel; and many other forms including profile work, splines and ratchets.

The engineering, development and manufacturing of gears, aircraft parts and units for the Army, Navy and Air Corps, *over a period of two wars,* have helped us perfect the essential element in gear generating—*Precision.* Your inquiry regarding any type of gear problem will quickly place at your disposal all of our experience and facilities.

ARMY E NAVY

KEEP ON BUYING WAR BONDS

THE STEEL PRODUCTS ENGINEERING CO.
1206 W. COLUMBIA STREET SPRINGFIELD, OHIO

are seriously affecting operation of the Controlled Materials Plan, reminiscent of the former priority system which broke down under pressure for steel earlier in the war. With no abatement in demand for wire, frequently revised production is further hampered by delays in rod delivered; mills dependent on Buffalo rod shipments have had to curtail in some instances. Only in spots are there openings for second quarter, including some oil tempered wire; most volume falls into third quarter.

Tubular Goods . . .

Tubular Goods Prices, Page 171

New York — District pipe distributors report stocks increasingly unbalanced, due to delays in mill shipments and continued heavy pressure from shipyards and contractors substantially on maintenance work. Most mills are quoting June and July on butt and lapweld pipe. Deliveries on mechanical and boiler tubing are even more extended and the situation is expected to become tighter with the placing of tonnage for 1200 steam locomotives recently booked for France and Russia.

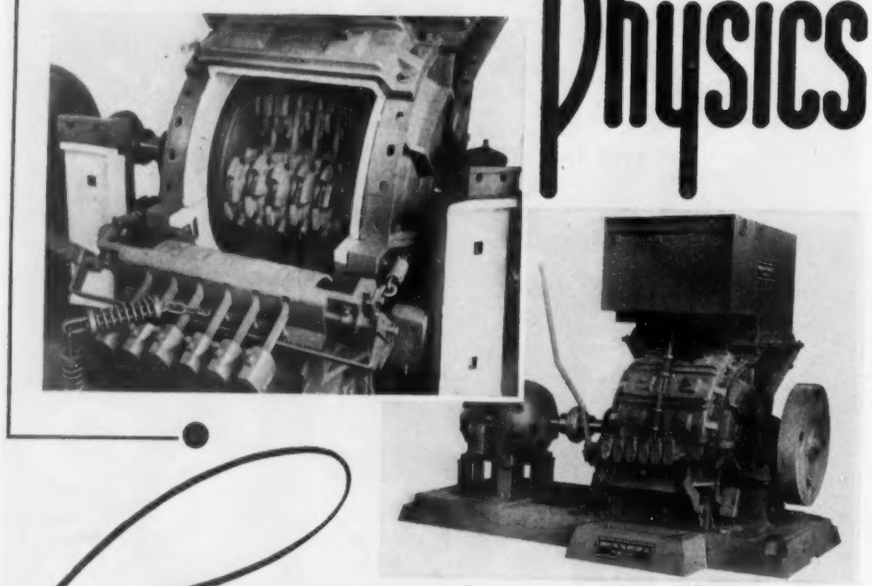
Tin Plate . . .

Tin Plate Prices, Page 171

Pittsburgh — A serious shipping problem confronting tin mills despite the fact there has been no additional shipping embargo. Some tonnage has been cleared through freight yards here in addition to the usual volume, but it is difficult to push up the output any appreciable amount, due not only to shortage of freight cars but also to lack of manpower in mill warehouses. New business continues active but somewhat disappointing, particularly in volume of light-weight plate being received. Overall volume of electrolytic plate has moved up, but most is in heavier grades, not the 0.25 coating permissible under the revised M-81.

Chicago — One district tin plate producer is booked solidly through second quarter, another has small openings in March and May, is closed for April. The latter has been confronted for some time by inability to move the product from its plant as rapidly as produced because of short car supply.

HARNESSING A LAW IN Physics



Centrifugal force

CENTRIFUGAL FORCE is the principle on which the American Ring Turnings Crusher is built. Four rows of wheels, or rings, each equipped with 24 teeth, whirl through the turnings that are fed into the hopper. Because they are activated by centrifugal force, the rings readily swing into and out of position. These crushers are built in several sizes. Descriptive literature will be mailed promptly for the asking.

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1539 MACKLIND AVE., ST. LOUIS 10, MISSOURI

Representatives in principal cities

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 171

New York — Bolt and nut makers are being deluged by orders, with backlogs again swelling rapidly. Some producers are now back to schedules of 10 and 12 weeks on small bolts and ¼ to ½-inch in diameter and on hexagons, particularly cold-punched sizes, 16 to 18 weeks. The Maritime Commission is the principal buyer of hexagons, although heavy tonnages are going in other directions.

Small bolts are going into a diversity of uses such as for prefabricated barracks, knock-down tanks for oils and liquids and for various requirements of the Signal Corps. The latter is said to be taking large quantities of ⅜ by 2¼-inch bolts. The North Atlantic combat division of United States Engineers is placing heavy specifications for reconstruction work and the Navy is buying substantial tonnages. A recent order included approximately 1000 tons for pontoons.

Manpower continues to handicap production. Third shifts now are said to be out of the question at practically all eastern plants. However, some producers are able to maintain a 90 per cent output on a two-shift basis. Delays in bar deliveries due to weather and traffic conditions have also hindered production in some quarters, although this is regarded as largely temporary. Meanwhile, notwithstanding the sold up condition of most carbon bar producers, bolt and nut makers claim that they are still able to pick up some sizes for shipment within three months.

Rails, Cars . . .

Track Material Prices, Page 171

New York — Orders for 1300 freight cars have been placed by three railroads, all to their own shops. The list includes 500 fifty-ton flat cars for the Chicago, Milwaukee, St. Paul & Pacific, 300 automobile box for the Missouri-Kansas-Texas and 500 fifty-ton box cars for the Pennsylvania, the latter, it being reported, for construction in fourth quarter.

Meanwhile, export demand for locomotives continues active, with Belgium negotiating through its representatives in Washington for 300 steam locomotives and Czechoslovakia reported figuring on 150 locomotives. Belgium is asking for deliveries in 1945 and is ex-

pected to take formal bids early in March.

Structural Shapes . . .

Structural Shape Prices, Page 171

New York — Although building construction continues relatively negligible, shape deliveries are at least holding their own, with two large sellers quoting June. Shipwork and continued diversion of steel and facilities to the shell program are behind the existing stringency, it is declared. Fabricating shops are bolstering operations somewhat by subcontracts, but in general have no extended backlogs.

Boston — Expansion in forging plant facilities has accounted for most structural contracts in the industrial field in New England territory; award of 1400 tons to American Bridge Co., a defense plant project at Lowell, Mass., to be operated by United States Machinery Corp. in shell production, is the third recently. Directives will be required for this steel, the shop being scheduled for operation in June. With few exceptions, structural fabricators in this area are seeking new work; volume of active inquiry is light with approximately 400 tons for a hospital in Vermont yet to be placed by Turner Construction Co.

Cleveland — Activity in structural fabricating shops has shown little change, with most work involving ship assembly parts, racks and structural parts for heavy presses and other equipment. Largest job pending in this area involves 600 tons for a Nickel Plate railroad bridge at Ashtabula; bids in. American Bridge Co. booked 600 tons through Hunkin-Conkey Construction Co. for Republic Steel Corp.'s strip mill expansion here. Vogt & Conant are general contractors for the Clark avenue bridge here, involving 500 tons. Fort Pitt Bridge Works has been awarded 180 tons for the Fairmount pumping station. Mill deliveries on standard shapes are now being promised for May.

Philadelphia — Standard structural shapes are being quoted for June shipment and in one case wide flange material is offered for July delivery.

Chicago—While considerable new war plant construction, principally ordnance works and tire plants, are getting under way little is in this territory. As a result, fabricators have few new inquiries. Mills find it difficult to work in shape orders for early delivery, because important war jobs are placed in schedules by WPB directives. This is virtually the only way tonnage for must projects can be obtained in reasonable time.

Reinforcing Bars . . .

Reinforcing Bar Prices, Pag 171

Chicago — As far as this district is concerned, new inquiry for reinforcing steel has reached the vanishing point, except for lots well under 100 tons. Furthermore, some recent awards are being held up because priorities are not forthcoming as expected.

Pig Iron . . .

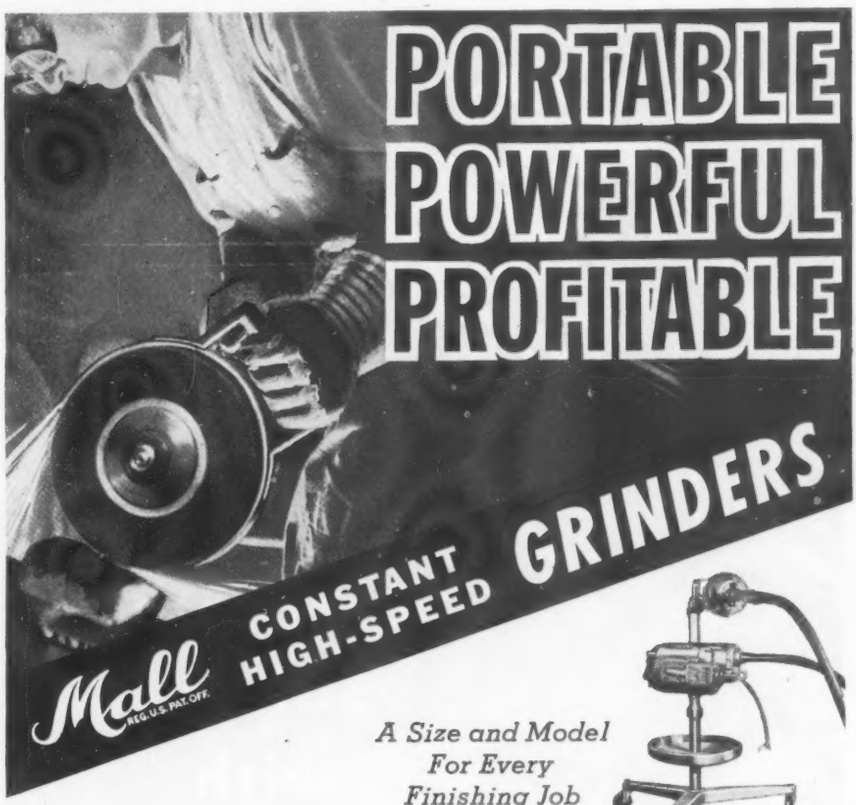
Pig Iron Prices, Page 173

Advance of $1 per ton on pig iron, effective Feb. 14, marks the first change in price since the end of 1940 when producers raised their prices $1 to the level at which they were frozen by the price-fixing order of Feb. 21, 1942. Charcoal iron is not included in the increase. Supply to consumers is improving as the railroad situation clears but there still is some shortage where deliveries have been belated.

Pittsburgh — The price increase was taken in stride here, with few repercussions. One question left unanswered by the announcement was the status of extra-price producers, but it was generally assumed the $1 increase would not apply except where the premium was less than $1, in which case they would be increased to the same level as other producers. Demand continues heavy, with supply reported short, due more to transport difficulties than to lack of production. Inventories generally are now below the 30-day minimum permitted. There have been no changes in blast furnace activity here, with 42 stacks in blast out of 50.

New York—Pig iron melt so far this month has been down from January on a daily basis, due mainly to delay in shipments as a result of bad weather and continued traffic congestion. The manpower situation is having some influence at some plants, but at the moment is not such an important overall factor. Curtailment has been due principally at foundries dependent upon iron from upstate where the movement, while now slightly better than a fortnight ago, is still considerably retarded.

Some informal allocations have been made where work is of especially critical character. There is still considerable dis-



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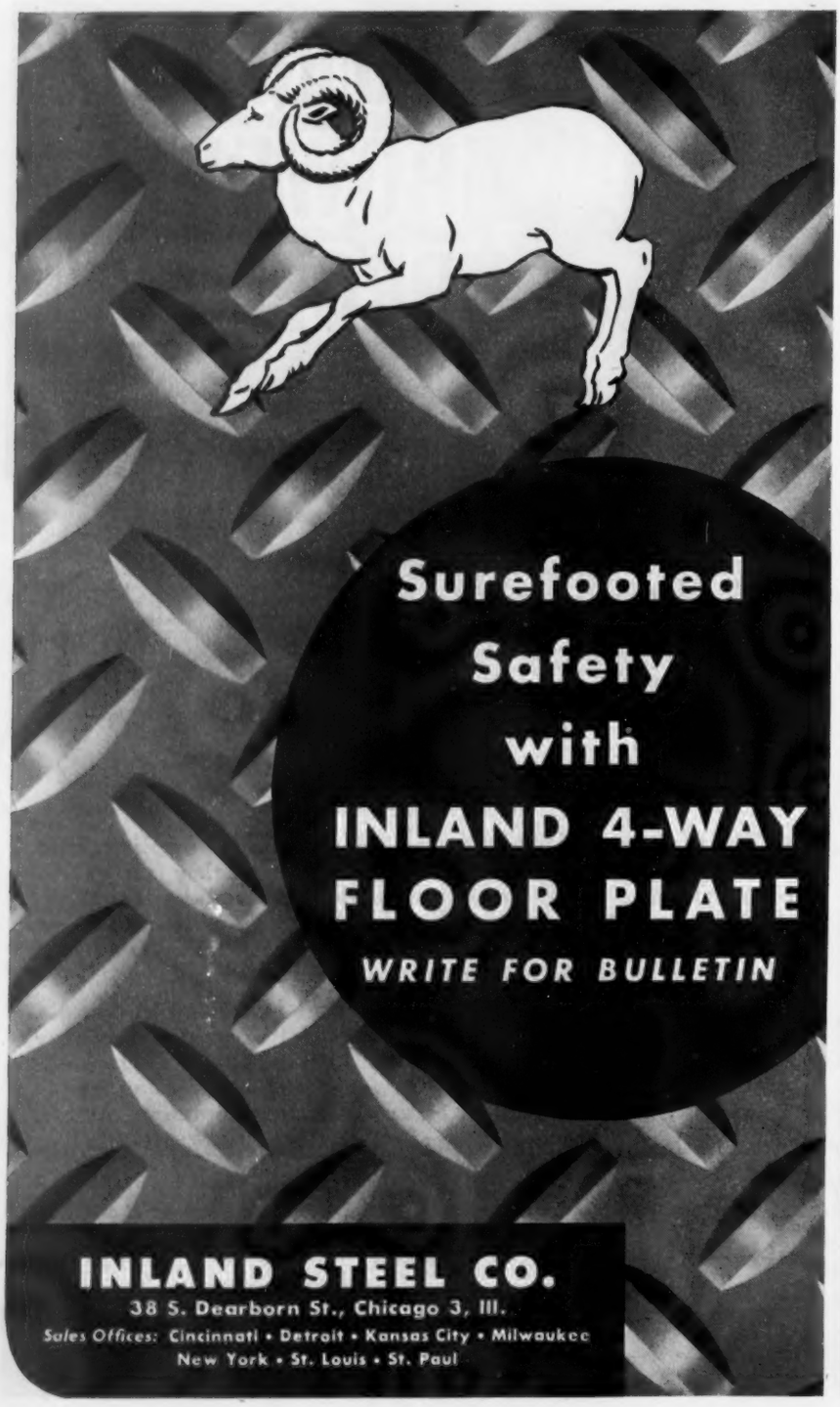
cussion as to possibility of a resumption of formal government allocation, but, the general feeling is that producers themselves have done all that can reasonably be expected under the severe weather conditions.

Cincinnati — Foundries in this district are estimated to have an average of 18 days supply of pig iron, and although all would prefer to carry the 30 days minimum they face the handicap of tardy shipments. Furnaces got behind in shipments, because of the embargo and other reasons, but so far the effect has not been serious. Demand for iron, well sustained, continues to be paced by the manpower situation. The drain on by-product coke, by diversion to heating, caused a pinch which probably is temporary. Serious delivery delays on beehive coke affect only moderate volume here.

Buffalo—Through transportation of pig iron has improved, delays continue and foundries in many cases are operating at low rate because of lack of iron. In some cases high priority iron is still on the ground, cars not being available for loading. Some shutdowns have resulted and many curtailments. Nearby melters are trucking iron, at increased cost. Pressure from New England foundries is especially heavy. Many cars are still in transit after long delays. Blast furnace operations here have advanced to 82.5 per cent of capacity. Two of three idle furnaces are out because of manpower shortage.



Boston—Except for some of the larger foundry consumers, several operating well below capacity, pig iron reserves are generally down to 30 days, frequently below. Shops subcontracting for prime contractors with more ample stocks of iron are among those operating with smaller inventories. Deliveries are still uncertain. Of the total melt close to 16,000 tons a month must be shipped into this territory, most from Buffalo, and not until transportation tangles are cleared more, will some users get stocks back to a margin of safety. As yet tight supplies have not resulted in steel works curtailments.

Philadelphia — Improved weather has stimulated flow of pig iron, although some consumers still press for tonnage. While there has been some talk of putting into operation some marginal furnaces which were taken off last year, it is believed that by the time this could be done, possibly 60 days or so, the present shortage will long have passed. There also now appears less likelihood of a return to formal allocations, which were dropped a little more than a year ago.

Chicago — The $1 increase in base price of pig iron, effective Feb. 14, came as a complete surprise to most sellers here, and there is some question as to whether the advance was adequate in view of the higher production cost figures cited by OPA. Demand for iron is moving a little faster than production, due to the fact foundries are in a slightly better position in manpower, and also that heavier castings figure in war demands, thereby increasing foundry melts.

Cleveland — Supply of pig iron is the tightest in months and little relief is indicated with manpower shortage restricting operations. Some 20 blast furnaces are idle and 8 others are being relined, on a nationwide basis, but present manpower shortage and lack of coal prevents bringing back into service any large number of the now idle high cost units. However, effort is being directed to bring at least some of these units into service. For the time being no action is expected to be taken by WPB on restoring pig iron allocations. Sellers state that recent price relief is inadequate to meet rising costs. Iron consumers cannot pass along the price increase except through the procedure of filling an individual application for such relief with OPA. Struthers Iron & Steel Co., Struthers, O., continues to get the 50 cents a ton extra, but no mention was made by OPA concerning Pittsburgh Coke & Iron Co., which is reportedly dismantling its furnace at Sharpsville, Pa.

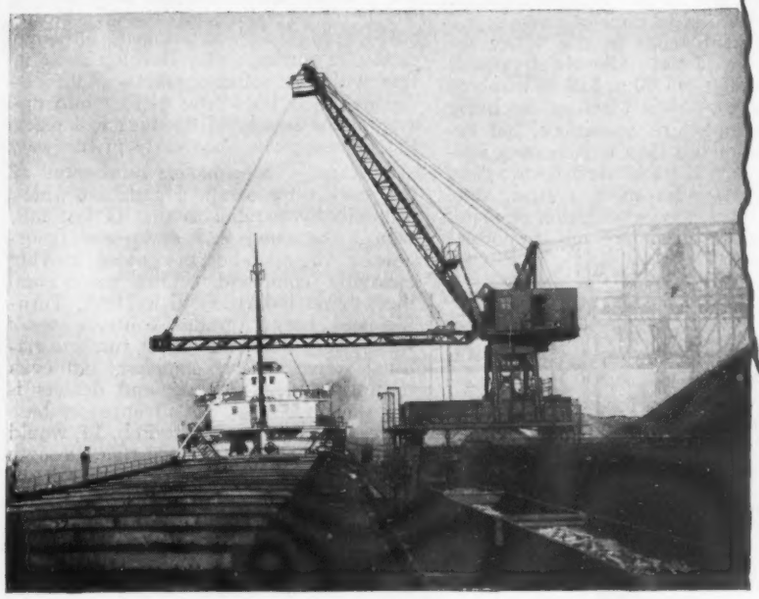
Scrap . . .

Scrap Prices, Page 174

Scrap continues relatively scarce in most districts, with dealers somewhat chary of accumulating stocks, for fear of a sudden drop in the event of sudden change in the war situation. Prices are at ceilings for practically all grades except borings and turnings, which are in larger supply as a result of heavy shell production. Some allocations are being used to supply steelmakers in greatest need.

Boston — Demand for steelmaking scrap is in excess of supply; yard operations are still hampered and allocations of industrial scrap are still subject to shipping delays. Shipments to outside

Below: This I.B. Combination Electrically Operated Gantry Crane loads and unloads pig iron or coal between boat and dock by using either magnet or bucket. Horizontal boom may be removed to permit handling of miscellaneous cargo.



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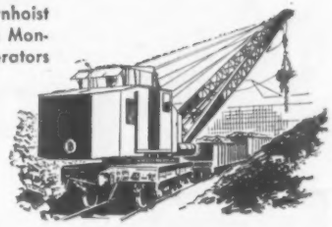

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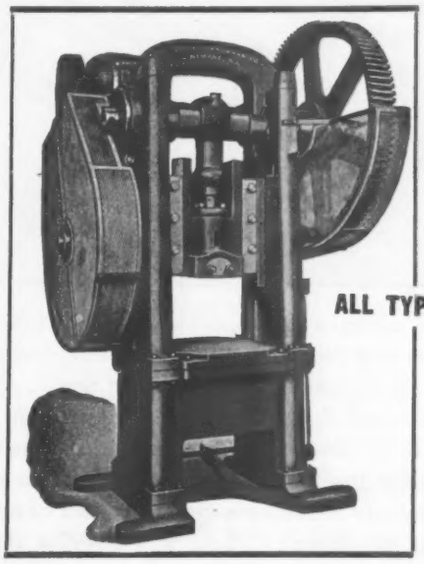

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consumers against contracts are slightly heavier, while district buyers are in the market for heavy melting grades, including bundles. There is some softening in crushed machine shop turnings, including alloys; production of the latter is upward. Most allocations are against industrial and government-owned material.

Softness in turnings is reflected in elimination of port differentials on these grades, the inland price of 9.06 applying to seaboard sales.

Buffalo — Scrap prices continue at ceilings, weakness in turnings in other districts not yet apparent here. Shipments are below requirements and dealers are averse to building up stocks, in fear of a sudden decline in case of war termination. One steelmaker has agreed to continuing contracts in case of sudden peace if dealers will make an effort to ship material in the present critical situation.

Cleveland—Scrap users continue to deplete inventories, with relatively little material coming in to replace tonnage. Further weakness in price of turnings has developed with sales in the valley reported at $13 a ton. Cleveland price is therefore about $11.50 to $12 on machine shop turnings. More turnings are being used in open-hearth operations, but accumulation of this item is increasing substantially. With the dearth of good open-hearth grades more critical, steel producers find poor segregation of material is again becoming an important problem. Mills in this district are still in a fairly good stock position, but are taking all available good open-hearth grades.

Philadelphia — Scrap buyers are still centering attention on getting in tonnage against existing cotracts, as they continue badly in need of material Until the present squeeze is past new buying will be of secondary importance. Meanwhile, prices are unchanged, although easing in turnings may develop soon in line with the softer market. With additional shell lines now getting into operation the supply of turnings will reach the highest peak since early in the war.

Chicago — Steelmakers remain out of the market for scrap, a situation which is familiarly parallel to that of last fall, when, like now, war news was favorable. All open-hearth grades moving currently command ceiling prices and there is no indication of a break. Turning and boring grades continue weak with prices nominal. Blast furnace material is particularly stagnant, and even trading between brokers and dealers is off sharply. The $1 advance in base price of pig iron, effective Feb. 14, would under normal conditions give strength to foundry scrap. However, these items have been in short supply for so long that a reaction is out of the question.

Detroit—On the basis of sales of borings and turnings to the Mansfield area, prices are off about $1 per ton, with machine shop turnings quoted at $9.00-$9.50, and short turnings $11.00-$11.50. Weakness continues in electric grades, mainly because the principal consumer here is out of the market through March. No change in buying prices is apparent as yet, however. Two principal buyers of open-hearth grades continue in the market in a limited way, paying ceiling prices.

Cincinnati — Inventories proved adequate, during the severe pinch in transportation, to carry scrap melt and some interests show little disposition toward tonnage buying. Demand, however, is active for good cast scrap, rails and low phos. Interest is also keener in some specialties. Offerings from other districts of borings and turnings further undermine prices which are being held unchanged, but weak.

Los Angeles—Prepared heavy melting steel scrap is moving at the recent level of about $3 under ceiling. Reclaiming of reusable materials by scrap dealers is on the increase, including iron and steel pipe, plates, sheets, bars and shapes. This has not progressed to the point of interfering with collection and preparation. WPB allocated shipyard scrap continues to move to the Middle West.

St. Louis — Scrap prices remain at ceiling with reserves showing a measure of improvement. Supplies are moving more freely due to a break in the weather. Open-hearth furnaces report a six-week reserve and blast furnaces somewhat more. There is heavy demand for gray iron foundry grades but steel turnings are down.

Warehouse . . .

Warehouse Prices, Page 172

Effective Feb. 15 Office of Price Administration authorizes resellers of iron and steel products to add warehouse and jobber markups to mill prices in resales of pipe and tubular products from supplementary storage or warehouse facilities. Previously these markups could be charged only if the warehouse

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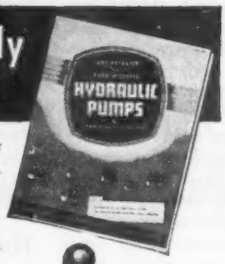

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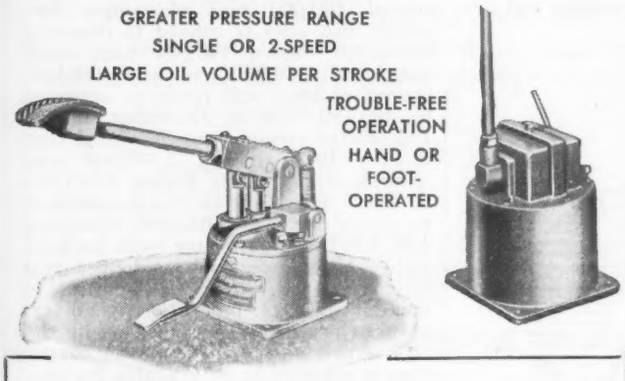

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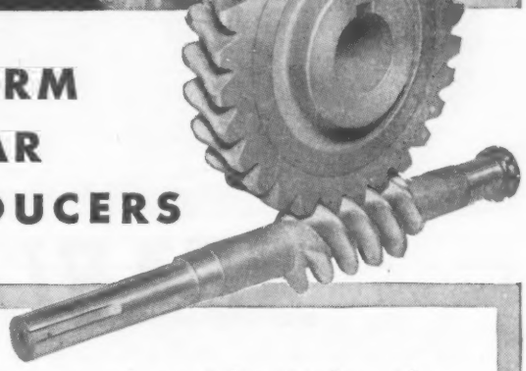

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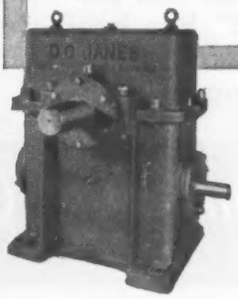

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pipe or tubular products actually had been unloaded, stored or delivered from premises regularly maintained for warehousing operations. Warehousemen and jobbers also may apply to OPA for permission to charge warehouse prices on resales of other iron and steel products from supplementary facilities under defined circumstances. Permission will be granted only where physical limitations compel storage for a short time at outside facilities. Details of the new order are presented on page 88 of this issue.

Cleveland — Shipment from warehouse has gained further and there is no indication of a decline with mill backlogs steadily more extended. Distributors expect some tightening of controls over sale of steel from warehouse stocks, resulting from general tightening in steel supply. Distributors' stocks are well below level of six months ago.

New York—Strong and broad demand for steel is depleting warehouse inventories, with mill deliveries delayed. Only plates are inclined to lag but increased ship repair may bring up volume. Increased alloy buying is notable, bars especially, and stainless sheets are active.

Los Angeles—Warehouses suffer serious shortage of sheets and plates with shape demand cutting deeply into stocks. Sheets are in heaviest demand and civilian users feel the pinch most. Recent OPA price regulations continue an unwelcome factor. Galvanized sheet shortage results from heavy demand and delay in shipments from the East.

Cincinnati — Warehouse demand shows the result of extended mill deliveries and transportation delays and supplies in some categories are becoming tight. Sheets have joined structural steel on the critically scarce list. Mill shipments so far have been fair on most steel but jobbers cannot maintain balanced stocks against eager buying.

Nonferrous Metals . . .

Nonferrous Prices, Page 175

New York — Pressure for zinc and copper continues heavy. Manpower and transportation are affecting production and deliveries. Against requests for around 160,000 tons of copper last month, deliveries of refined to domestic consumers totaled 145,904 tons, compared with 156,800 tons in December. Output of brass mill products increased to 199,180 tons in December against 192,743 the previous month. Total production 1944 reached 2,506,600 tons of brass mill products against 2,805,013 in 1943. Of this strip, sheets and plate accounted for 1,636,464 tons, compared with 1,997,409 tons of the same products 1943. Military demand for copper strip is strong. By progressive increases in monthly rate of production WPB expects to meet total requirements by the end of this year. Meantime no copper strip is expected to be available for anything but military and connected essential needs. Copper base alloy rod, tubing and other brass mill products are also still seriously limited by manpower shortages.

Zinc deliveries reached a new high last month and continue at a peak of approximately 93,000 tons a month. Demand is somewhat unbalanced with special high grade tighter. Efforts are being made to switch more users back to regular high grade, including brass producers and rollers.

New orders applying to production, use and distribution of all nonferrous metals are usually on the side of further restrictive controls. One further limits amount of lead as a protective sheath in manufacture of insulated wire and cable. Restrictions and inventory regulations recently applied to lead are becoming effective and requests for March are below the first two months this year. Stockpile has been estimated at about 75,000 tons.

With terms included to encourage producers to ship better than 18 per cent material, agreement has been reached for the purchase of Bolivian tin concentrates on a basis of 63.50 cents per pound of tin contained.

Manganese Castings Up 4%

An increase of 4 per cent in ceiling prices of all manganese steel castings has been allowed by Office of Price Administration, effective Feb. 12. Reason for the increase is stated to be because the manganese steel industry had not been earning an amount equal to its adjusted 1936-39 base period profits.

During the 1940-42 period business and war activity held profits up well but in 1943 rising costs pressed noticeably against price ceilings and during 1944 a study showed a net profit of only 2 per cent for the first nine months. Accordingly it was determined that an increase of 4 per cent would restore the

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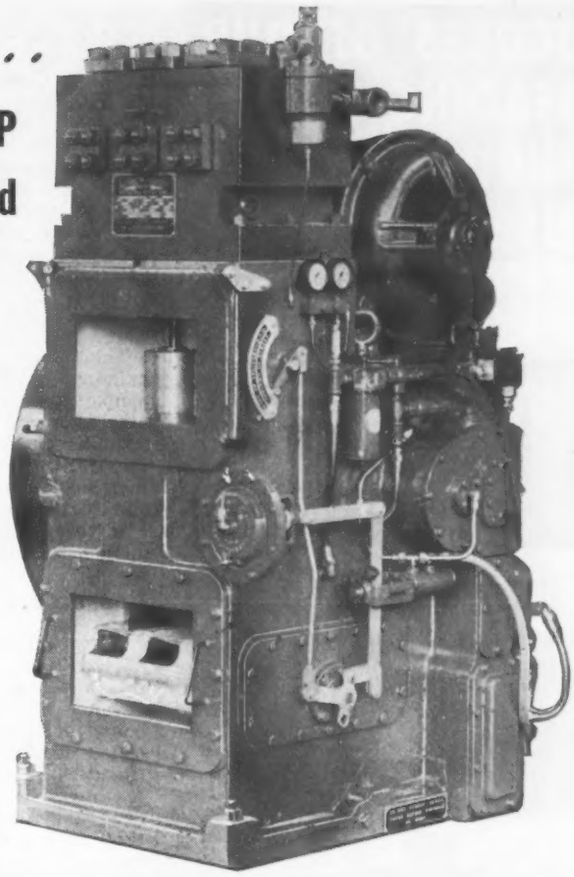

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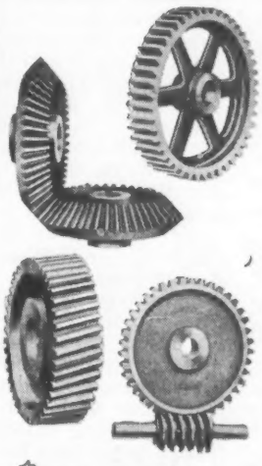

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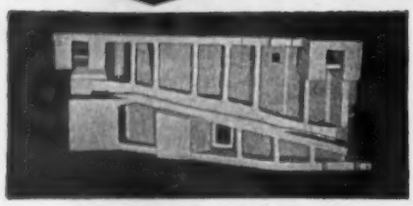

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Steel in Europe . . .

London — (*By Radio*) — General demand for steel products in Great Britain is quieter, with earlier deliveries from mill now possible. A good market exists for wire rods, sheets and billets. Mills are booked generally for three months. Demand for shell steel is active.

French To Buy Equipment

The French Naval Mission, Munitions building, Washington 25, D. C., contemplates entering the market in the near future for equipment for the reconstruction of the French navy yards and ship yards. Purchases under consideration include machine tools, sheet metal and boiler shop equipment, foundry equipment, hoisting and material handling machinery.

Canada . . .

Toronto, Ont. — With most steel contracted in connection with war production a buying lull on this account has developed. However, further buying is being maintained with most orders associated with nonwar enterprise and on an if-and-when delivery basis.

On various types of war steel, however, mills are almost solidly booked through first half and comparatively little supply is available for civilian use. On some types of war production, British and Canadian cancellations are going into effect almost daily and there is a possibility that these will make steel available for nonwar consumers. United States shell and munitions contracts, however, continue to absorb the greater part of bar mill production, and on both carbon and alloy grades producers are solidly booked on most sizes into July.

While there has been no slackening in sheet demand, with consumer requirements far in excess of available supply, there has been some tapering off in buying, mainly due to the fact that mills are fully booked and are unable to promise deliveries. The most serious shortage appears to be in galvanized sheets.

On steel plates orders are in fair volume but producers report no difficulty in meeting demand. Most of the new business is associated with nonwar production, with heavy buying reported from railroad car and locomotive builders and implement makers. Producers are offering delivery against current orders within two months.

Sharp improvement in various types of new construction projects has created a stronger demand for structural and reinforcing steel, with awards for the past week totaling 15,000 tons and a like tonnage in prospect for early closing.

Wire and nail demand is heavy and mills are filled with orders for delivery over the next six months, mainly on war account. While large orders have been booked from various farm communities there seems to be doubt that shipments can be made for several months.

Merchant pig iron sales lack special feature. While a number of larger melters appear anxious to cover long term requirements and are prepared to place forward delivery contracts or take immediate delivery of large tonnages in anticipation of early price advances, blast

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Youth may spring eternal, but only springs embodying SCIENTECH design can remain youthful.

LEE SPRING COMPANY, INC.
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LEE-BUILT TRADE MARK SPRINGS
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furnace operators decline to co-operate and accept orders on a conservative tonnage basis and contracts for two or three months. Iron contracted for carries the stipulation that price will be made known at time of delivery, this condition also applies to all steel materials.

Scrap receipts continue at a minimum, with no deliveries reported from outside sources, due to adverse collection and transportation conditions. Dealers depend on local plants for supply. Deliveries of steelmaking scrap to various consuming points in Ontario were down to less than 15 per cent of requirements for the week, forcing consumers to draw heavily on stocks. Iron scrap is scarce and dealers are running well behind customers' requirements for cast scrap and stove plate, with no indication of early improvement.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3000 tons, truck tire plant, Nashville, Tenn., for Goodyear Tire & Rubber Co., to Virginia Bridge Co., Roanoke, Va.; bids Jan. 29.

2500 tons, tire plant, Tuscaloosa, Ala., for Goodrich Tire & Rubber Co., to Bethlehem Steel Co., Bethlehem, Pa.

1400 tons, forge shop building, shell plant, Lowell, Mass., to be operated by United Shoe Machinery Corp., Boston; to American Bridge Co., Pittsburgh; J. M. Fitzgerald Co., Boston, general contractor.

1350 tons, power house, Gopher Ordnance Works, Rosemont, Minn., for E. I. du Pont de Nemours & Co. Inc., to Clinton Bridge Works, Clinton, Iowa, for fabrication by Allied Structural Steel Co.'s.

1350 tons, power house, Wabash Ordnance Works, Dana, Ind., for E. I. du Pont de Nemours & Co. Inc., to Clinton Bridge Works, Clinton, Iowa, for fabrication by Allied Structural Steel Co.'s.

850 tons, ordnance plant at Dana, Ind., to Bethlehem Steel Co., Bethlehem, Pa., through E. B. Badger & Son Co., Boston.

230 tons, hangar and additional facilities, Maxwell Field, Montgomery, Ala., for War Department, to Stupp Bros. Bridge & Iron Co., St. Louis.

220 tons, four deck plate girder spans, Leeds, Ala., for Southern railroad, to Mt. Vernon Bridge Co., Mt. Vernon, O.

128 tons, six 40-foot girder spans, bridge, Red Wing, Minn., for Chicago, Milwaukee, St. Paul & Pacific railroad, to Lakeside Steel & Bridge Co., Milwaukee.

125 tons, turntable, Omaha, Neb., for Union Pacific railroad, to R. W. Young Mfg. Co., Chicago; bids Dec. 10.

STRUCTURAL STEEL PENDING

1000 tons, two navy warehouses at Norfolk, Va.; bids Feb. 26.

1000 tons, truck tire plant, Houston, Tex., for Kelly-Springfield Tire Co.

550 tons, plant alterations and additions for Firestone Tire & Rubber Co., near Pottstown, Pa.; bids in.

426 tons, deck plate girder spans, highway bridge, Valley, Neb., for state.

360 tons, Luzerne County bridge, Pennsylvania; bids Feb. 26; 300 tons of reinforcing bars also required.

350 tons, apartment building, Caracas, Venezuela, for export.

251 tons, highway bridge, between Fremont and Elk City, Neb., for state; bids Feb. 8.

PLATES . . .

PLATES PLACED

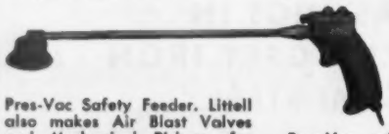
100 tons or more, 2,000,000-gallon water tank, Washington, D. C., to Chicago Bridge & Iron Co., Chicago, $142,450; bids Dec. 29.

LITTELL REELS
for Feeding Coil Stock

COIL feeding with LITTELL Automatic Centering Reels has these advantages: (1) Increased production. (2) Less waste. (3) Improved quality. (4) Easier loading. (5) Easier delivery to presses. (6) Economy of storage space.

LITTELL Reels hold coils firmly in place. Supporting arms, quickly adjustable, grip coils and keep them accurately centered. Properly centered, the coils unreel smoothly. Littell can supply Reels, plain or motor-driven, for handling coils of from 100 to 20,000 lbs. weight, and in various I.D., O.D., thicknesses and widths. REQUEST BULLETINS.

No. 3 and No. 5 Littell Automatic Centering Reel. No. 3 has coil capacity of 300 lbs. Will take coils max. width 6½", max. O.D. 46", I.D. 8½" to 21". No. 5, coil capacity 600 lbs. Will take coils max. width 10", max. O.D. 46", I.D. 8½" to 21".



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Pres-Vac Safety Feeder. Littell also makes Air Blast Valves and Mechanical Pickers, for feeding and ejection of parts without endangering workmen's hands.

Pres-Vac, with vacuum cup, picks up flat materials and feeds them into press, keeping hands out of danger zone. Cup is placed on work, trigger pulled and vacuum lifts material. Release of trigger drops material in place.

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Many plants use batteries of Magni-Rays for inspection of small parts. Order one with our money-back guarantee—then equip your shop.

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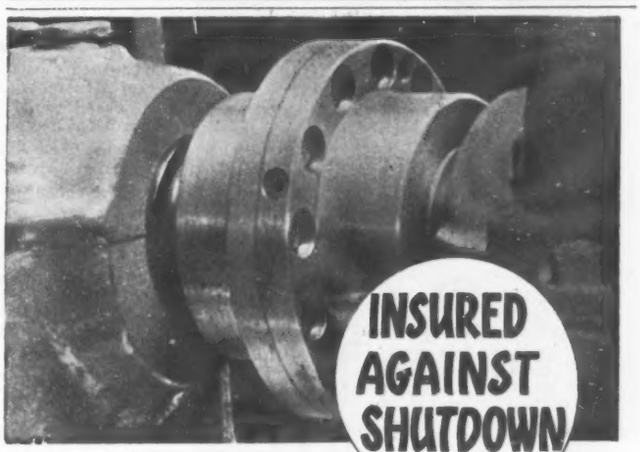

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Hubs and cover sleeves made of heat treated forgings; all contact parts constantly lubricated. Specify WALDRON for dependability — economy.

JOHN WALDRON CORP.
Main Office and Works
New Brunswick, New Jersey
COUPLINGS

REINFORCING BARS . . .

REINFORCING BARS PLACED

2300 tons, export to Venezuela, to United States Export Co., through Merritt-Chapman & Scott Co., New York.

100 tons, manufacturing plant for American Briquet Co., Philadelphia, at St. Nicholas, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

100 tons, manufacturing plant for American Briquet Co., Philadelphia, at Locust Point, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

REINFORCING BARS PENDING

4800 tons, two sections storm water outlets for New York City municipal Idlewild airport, Queens; general contracts to N. DiMenna & Sons, Bronx, 2100 tons, and A. Catapano, Glendale, L. I., 2700 tons.

460 tons, veterans' hospital, Lexington, Ky., for U. S. Veterans Administration: general contract to R. P. Farnsworth Co., New Orleans; bids Feb. 6.

250 tons, addition, Charlestown Ordnance works, Charlestown, Ind., for E. I. duPont de Nemours & Co.; bids Feb. 10.

250 tons, grain elevator, Bellevue, O., to Joseph T. Ryerson & Son Inc., Chicago; James Stewart Corp., Chicago, contractor.

250 tons, repair shops for Northern Pacific, St. Paul; bids Feb. 20.

225 tons, Missouri Farm Association Grain & Feed Co., Cabool, Mo.

120 tons, water treatment plant, Rock Island Arsenal, Rock Island, Ill.; W. E. O'Neil Construction Co., Chicago, low on general contract; bids Feb. 7.

100 tons, Oliver Farm Equipment Co., South Bend, Ind.

RAILS, CARS . . .

RAILROAD CARS PLACED

Chicago, Milwaukee, St. Paul & Pacific, 500 fifty-ton flat cars; to own shops.

Colorado & Wyoming, 50 mill-type gondolas to Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill.

Export, to Russia, 665 forty-ton tank cars, 400 to General American Transportation Corp., Chicago, and 265 to American Car & Foundry Co., New York.

Missouri-Kansas-Texas, 300 automobile box cars; to own shops.

Pennsylvania, 500 fifty-ton box cars; to own shops for construction in fourth quarter.

LOCOMOTIVES PENDING

Belgium, 300 steam locomotives, bids to be asked shortly through representatives in Washington; estimated cost around $36,000,000.

Czechoslovakia, 150 locomotives, negotiations reported.

Tightening of Warehouse Steel Sales Control Seen

Some tightening of controls over sale of steel from warehouse stocks may be expected, in the face of expanding war demands, members of the General Steel Warehouse Industry Advisory Committee were told by War Production Board officials at a recent meeting.

WPB approval has already been temporarily suspended, WPB officials said, on warehouse sales of critical steel products on an "ex-allotment" basis.

William B. Todd, Director of WPB's Steel Division, told members of the committee that mounting military needs required WPB to screen carefully all steel requirements to insure that urgent war demands were satisfied.

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When you stop at The Roosevelt you don't risk getting marooned like this. For you'll be within walking range of Manhattan's Midtown activities. Direct passageway from Grand Central Terminal to hotel lobby. A reservation at The Roosevelt liquidates a lot of bother.

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TEXAS: Abilene, El Paso, Longview, Lubbock, Plainview
MEXICO: *The Palacio Hilton* in Chihuahua
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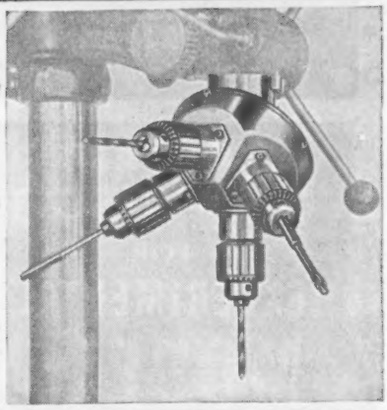
QUICK INDEXING
FINGER-TIP CONTROL CHANGES DRILL POSITIONS



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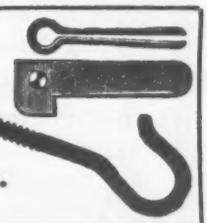

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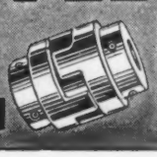

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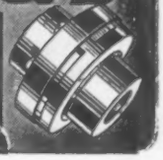

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Freight Rate Aid Is Seen for Steel Plant at Geneva, Utah

(*Concluded from Page 75*)

steel plate from Geneva to Los Angeles, asserted that freight rates would take care of themselves "as a matter of common sense and mutual interest." He pointed out that traffic in finished steel from Geneva to the coast plus the tonnage in coal, iron ore and limestone to the Utah plant "might well mean a peacetime difference between a modest profit and a deficit."

A different approach was taken by W. W. Hale, vice president of the Southern Pacific railroad, who held that the controlling factor in the future of the Geneva plant's future operation lay not in "any power or influence the railroads might exercise," but in the "economic conditions over which the railroads have no control."

Envisioning a definite trend toward increase in West Coast manufactures of all kinds, Mr. Hale said the Southern Pacific is interested "in locating as many of these activities on our lines as we possibly can."

H. W. Prickett, traffic counsel, Utah State Department of Publicity and Industrial Development, asserted that on the basis of an analysis of the railroads' 1942 statements finished steel could be moved to the coast at a cost to the carriers of less than $4 a ton. Utah leaders are hoping to obtain a postwar rate of between $4 and $6.50.

Present Rates Under Normal Level

The normal published rate would be $12 a ton, but the Union Pacific carries steel from Geneva to Southern California for $8 a ton, under a wartime contract. The Denver & Rio Grande and Western Pacific haul the steel to San Francisco for the same rate. Union Pacific carries Geneva products to Portland, Oreg., for $9.50 and to Seattle for $10.

The Southern Pacific does not have a line to Geneva and is not a party to the wartime rates. Mr. Hale pointed out, however, that the Southern Pacific for a long time has been carrying pig iron from Ironton, Utah, to San Francisco for $4.95 a ton, "the approximate total cost in peacetime of moving iron from Sparrows Point, Md., by water to industry delivery in the San Francisco Bay area."

Delegates to the Western States Council spent several hours inspecting the modern facilities at Geneva. Attendance at the meeting was officially stated as 49 to avoid conflict with the recent ban on wartime meetings, but total attendance was somewhat more.

Among those present at the conference were Utah tax commissioners, who suggested that if U. S. Steel, Mr. Kaiser, and perhaps others were going to compete for the mill, the facilities must be worth more than they had thought before.

Walther Mathesius, formerly vice president in charge of operations for U. S. Steel and who now heads the Geneva Steel Co., said frankly he would like to operate the plant after the war and expressed the opinion that it could be done at a profit.

Sen. Ralph O. Brewster (Rep., Me.) proposed the government-owned surplus facilities be disposed of through a "round-table auction block" presided over by a representative of the Defense Plant Corp. and attended by representatives of other government agencies. Senator Brewster's plan was evolved, he said, to eliminate red tape and to prevent "frustration of business initiative through government indecision."

Dr. J. H. Mahoney, director of the Bureau of Economic and Business Research, University of Utah, asserted that western raw materials could be assembled at western blast furnaces after the war at costs as low as anywhere in the country.

A 15-member committee, headed by K. T. Norris, Norris Stamping & Mfg. Co., Los Angeles, was appointed by the Western States Council to follow through on the group's program to maintain the western steel industry.

Labor Shortage Becomes More Critical in Chicago

Thousands of man-hours are being lost in Chicago area through confusion arising in transfer of 10 per cent of workers from unclassified employers to war jobs in accordance with a recent WMC order. This WMC directive, applying only to this area, sets Feb. 15 as the deadline for release of 5 per cent of workers from unclassified employers of over 10 workers and March 1 for the full 10 per cent, using March, 1944, as the base period.

Employers must not remove a worker from payrolls until United States Employment Service certifies the worker has been placed in a war job. The entire 10 per cent reduction is to be made in male ceiling employment, if possible. Under the new regulation, women now are prohibited from taking jobs in industry without USES permission.

It is estimated the Chicago district will require 70,400 additional workers by March 15, another 90,600 by May 15 and another 107,500 by July 15. There is an immediate demand for 16,200 workers, principally men, the most serious shortage being unskilled labor.

War production in the Chicago area could be increased 17 per cent without increasing the number of workers, if absenteeism and job jumping could be cut down 2.0 per cent, asserted Col. John Slezak, chief, Chicago Ordnance District, Feb. 13, as government and management officials discussed means for combating absenteeism.

Survey of 14 critical war plants showed absenteeism to be 8.3 per cent and the turnover rate 11 per cent.

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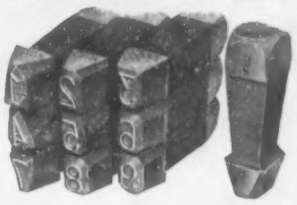

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CONSTRUCTION AND ENTERPRISE

OHIO

AKRON, O.—Akron Standard Mold Co., 1624 Englewood street, care W. Siegler, will build a one and part two-story addition 32 x 90 feet.

ALLIANCE, O.—City, City Hall, plans postwar modernizing of sewage disposal plant at cost of $235,000 and additional sewers to cost $100,000. Chester Engineers, 210 East Park Way, Pittsburgh, are engineers. W. D. Sponseller, City Hall, is city engineer.

CAMBRIDGE, O.—City, City Hall, has preliminary plans for postwar sewage disposal plant costing $275,000. Floyd Browne & Associates, Marion, O., are consulting engineers. F. Sheehan, City Hall, is city engineer.

COLUMBUS, O.—City, City Hall, is having plans made for postwar enlargement of sewage disposal plant to cost $1,800,000 and additional sewers costing about $3 million. P. W. Maetzel, City Hall, is city engineer.

FREMONT, O.—City plans postwar construction of a million-gallon water storage tank costing $50,000, sewage disposal plant costing $150,000 and sewers costing $140,000. Charles Hochenedel, 617 Croghan street, is consulting engineer.

GIRARD, O.—General Paint Co., M. M. Bowen, division manager, 3091 Mayfield road, Cleveland, has let contract to Austin Co., 16110 Euclid avenue, Cleveland, for design and construction of a one-story 170 x 360-foot plant, to cost about $275,000.

GRAFTON, O.—W. O. Larson Foundry Co., 799 Barchard street, will alter and repair a portion of its foundry building and install additional equipment to increase war production, at cost of about $23,000.

IRONTON, O.—City, City Hall, plans postwar construction of a sewage treatment plant costing $300,000 and additional sewers costing about $200,000.

SPRINGFIELD, O.—City, City Hall, plans postwar construction of a water treatment plant, reservoir and supply pipeline, to cost about $1,250,000. W. E. Lucas, City Hall, is city engineer.

STEUBENVILLE, O.—Steubenville Stamping Co., Jack F. Harris, president, has been incorporated and will remodel a factory building at 215 South Court street to produce metal stampings. Harry B. Chalfant, National Exchange building, is secretary.

ZANESVILLE, O.—City, City Hall, plans postwar construction of a water purification and softening plant, to cost $600,000. H. O. Church, City Hall, is city engineer.

MAINE

BATH, ME.—City, Treasurer's office, City Hall, plans refuse incinerator, including two furnaces and accessories, to cost about $100,000. Metcalf & Eddy, 1300 Statler building, Boston, are engineers.

MASSACHUSETTS

HOLYOKE, MASS.—Public works department, City Hall, plans postwar construction of an incinerator plant costing about $275,000. Keis & Holroyd, 257 Broadway, Troy, N. Y., are consulting engineers. E. A. Maher, City Hall, is city engineer.

CONNECTICUT

EAST HARTFORD, CONN.—Universal Mfg. Co., 713 Connecticut boulevard, will reconstruct its four-story factory building at cost of $100,000.

THOMASTON, CONN.—Town board of selectmen, Town Hall, plans postwar construction of a sewage treatment plant and sanitary sewers, costing about $350,000. Buck & Buck, 650 Main street, Hartford, Conn., are consulting engineers.

WINSTED, CONN.—City, J. W. Darcy, mayor, plans postwar construction of a sewage disposal plant, and trunk sewer, to cost about $350,000. Buck & Buck, 650 Main street, Hartford, Conn., are consulting engineers.

NEW JERSEY

WAYNE, N. J.—Mac Moulding Co., Route 23, has let contract to Edmund R. Stearns Inc., 184 Glenridge avenue, Montclair, N. J., for a one-story 120 x 150-foot fuze plant costing $210,000. J. Dunn, care owner, is architect.

PENNSYLVANIA

BEAVER FALLS, PA.—Babcock & Wilcox Tube Co., P. D. White, vice president, has let contracts for a one-story 126 x 200-foot plant addition costing about $85,000.

MARCUS HOOK, PA.—General Chemical Co., 40 Rector street, New York, is having plans drawn by O. Fisher, architect, 103 Park avenue, New York, for improvements to plant, to cost about $50,000.

MEADVILLE, PA.—American Viscose Corp., J. L. Shade, purchasing agent, Delaware Trust building, Wilmington, Del., is having survey made by P. G. Keil Corp., Marcus Hook, Pa., for plant expansion.

LOCUST SUMMIT, PA.—American Briquet Co., 1417 Sansom street, Philadelphia, will build a coal briquet manufacturing plant here with Defense Plant Corp. funds. Day & Zimmerman Inc., Packard building, Philadelphia, is in charge as engineer. Similar plant is planned for St. Nicholas, Pa. Cost of each is estimated at $1,250,000.

PHILADELPHIA—Reading Co., E. Y. Allen, chief engineer, Reading Terminal, has let contract to J. R. Farrell, 4422 Market street, for engine shop additions and alterations, to cost about $40,000.

PITTSBURGH—F. J. Kress Box Co., 1 Twenty-eighth street, F. J. Benjamin, vice president, has let contract to several builders for altering boilerhouse, adding new boiler and conveying equipment, to cost about $50,000.

PORT ALLEGANY, PA.—Pittsburgh Corning Corp., 226 Duquesne Way, Pittsburgh, is having plans made by John W. Cowper Co. Inc., Sidway building, Buffalo, for a one-story plant addition, estimated to cost $80,000. J. P. Staple is general manager.

SHARON, PA.—Westinghouse Electric & Mfg. Co., Union Bank building, Pittsburgh, will build a 60 x 300-foot plant addition and install a three-ton crane, to cost about $107,000.

SHARON, PA.—Sharon Steel Corp., W. Jackson, general works manager, South Irwin avenue, has plans for a 32 x 40-foot preheating furnace and electric furnace, to cost about $160,000.

WILLIAMSPORT, PA.—Aviation Corp., Spencer Heater division, plans erection of a compressor building and alterations to foundry, with additional equipment, at cost of over $600,000.

MICHIGAN

CLAYTON, MICH.—Van's Welding Service has been incorporated with $5000 capital to conduct a welding business, by Frank E. Novak, 40 North Manning street, Hillsdale, Mich.

DETROIT—Winter Bros. Stamping Co., 7351 Lyndon street, has plans for a metal stamping plant costing $75,000.

DETROIT—Lincoln Die Casting Inc., 1442 Free Press building, has been incorporated with $25,000 capital to design and manufac-

Scott Holloway
Vice President

MANAGEMENT COUNSEL

Directing our Department of Industrial Engineering, Mr. Holloway acts as counselor on problems pertaining to production planning, material control, methods, work simplification, scrap and salvage, and organization procedure. He is a registered, licensed, professional engineer with a B.S. degree in mechanical engineering from Purdue University. He has gained extensive experience through prominent positions with leading tool manufacturers, large home appliance manufacturers and other nationally known companies.

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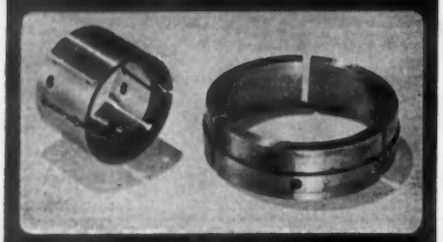

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DETROIT—Ross Mfg. Co., 700 Harper street, has been incorporated with $50,000 capital to manufacture mechanical devices and supplies, by Frank W. Donaldson, 17203 Griggs street.

DETROIT—McLouth Steel Corp., 300 South Livernois street, has let contract to James A. Moynes & Co., 921 West Milwaukee avenue, for an addition to its pickling building.

DETROIT—Federal Mogul Corp., 11031 Shoemaker street, has let contract to W.J.C. Kaufman Co., 10610 Shoemaker street, for fire rebuilding of a foundry at its Detroit plant.

EATON RAPIDS, MICH.—Industrial Fabricating Inc., 817 Hall street, has been incorporated with $25,000 capital to conduct a general welding and fabricating business, by Joseph Miller, 817 Hall street.

JACKSON, MICH.—Miller-McCloskey Plating Corp. has let contract to the Austin Co., 429 Curtis building, Detroit, for a factory building.

KALAMAZOO, MICH.—Fuller Mfg. Co. plans construction of a plant addition.

MIDLAND, MICH.—Dow Chemical Co. plans a waste disposal plant to cost about $570,000.

SAGINAW, MICH.—Louis Ross Refining Co., 7177 North Washington street, is having plans prepared for an addition to increase capacity by 2500 barrels daily, including cracking plant, piping and tanks, to cost about $150,000.

ILLINOIS

MATTOON, ILL.—Gar Wood Industries, 7924 Riopelle street, Detroit, will build a 100 x 600-foot factory, general contract to R. J. Vrooman & Co., 6432 Cass avenue, Detroit. J. A. Stromberg, 140 South Dearborn street, Chicago, is architect. (Noted Feb. 5.)

UTICA, ILL.—Philadelphia Quartz Co., 121 South Third street, Philadelphia, has let contract to Schless Construction Co., 176 West Adams street, Chicago, for a boilerhouse costing about $40,000.

INDIANA

ANDERSON, IND.—Arcade File Works plans postwar construction of a powerplant costing about $80,000, with equipment.

MARYLAND

BALTIMORE—Gar Wood Industries Inc., Detroit, engaged in manufacture and repair of truck bodies, etc., has bought 35 x 172 feet adjoining its plant for future expansion.

BALTIMORE—Marine Radio Co., engaged in war work for the Navy, has moved from 1400 Morland avenue to larger quarters at 526 St. Paul street.

KENTUCKY

LOUISVILLE, KY.—National Carbide Corp., 60 East Forty-second street, New York, plans construction of a chemical plant here, estimated to cost about $96,000.

VIRGINIA

ARLINGTON, VA.—Board of commissioners, Arlington county, Court House, plans sewage disposal plant additions and alterations to cost $600,000. Alexander Potter Associates, 50 Church street, New York 7, are engineers.

CALIFORNIA

EMERYVILLE, CALIF.—General Cable Co. has awarded a contract to Cahill Bros., 206 Sansome street, San Francisco, for a two-story reinforced concrete factory and office building costing about $450,000. W. G. Corlett and A. W. Anderson, Bank of America building, Oakland, Calif., are architects. Steel has been let to Bethlehem Steel Co., Alameda, Calif.

GLENDALE, CALIF.—Fray Machine Co. has been formed by James H. Richards and associates and has established a plant at 515 West Windsor road.

GLENDALE, CALIF.—Cree Diamond Abrasive Tool Co., formed by Russell J. Manderschied and Charles Cree Manderschied, has established its plant at 1519 North Verdugo road.

GLENDALE, CALIF.—Holga Metal Production Co., formed by Myron Hemmerdinger and associates, has established its plant at 5210 San Fernando road.

LONG BEACH, CALIF.—South & Cherry Machine Co., formed by Robert Micek and LaVerne Micek, has established its plant at 2000 South street, corner of Cherry street.

LOS ANGELES—R. E. King Precision Mfg. Co. has been formed by R. E. King and is operating at 1401 Summit Drive.

LOS ANGELES—Precision Gasket Mfg. Co., formed by Herman H. Thiemen, has established its operations at 7100½ Cranshaw boulevard.

LOS ANGELES—Universal Precision Co., composed of C. W. Marples, E. P. Leonard and H. W. Sawyer, has located its plant at 7213 Santa Monica boulevard, zone 46.

LOS ANGELES—Federal Engineering & Fabricating Co., formed by M. Albert Heger and E. F. Henkle, has located its plant at 3151 Los Feliz boulevard.

LOS ANGELES—G. & W. Machine & Tool Co., formed by Wilfred Warnick Sr and associates, is conducting production at 6917 San Pedro street.

LOS ANGELES—Rankin Bros. Machine & Tool Works, organized by T. D. Rankin and Ralph R. R. Rankin, has established operations at 7519 Santa Fe avenue, Huntington Park, Los Angeles.

LOS ANGELES—Wilgus Mfg. Co., 1722 East Sixteenth street, has a building permit for a machine shop addition 37 x 50 feet, to cost about $3000.

LOS ANGELES—Norris Stamping & Mfg. Co., 5215 South Boyle avenue, has received WPB priorities for construction of a building, railroad spur and installation of machine tools to a total cost of $521,230.

SAN DIEGO, CALIF.—Mechanical development Co., 6653 Amherst drive, has been formed by William R. Otey.

SAN DIEGO, CALIF.—Ideal Tool & Die Works, 2611 National avenue, has been formed by Martin Lacko and Peter Radosevich.

SANTA MONICA, CALIF.—Gordwell Machine Works, formed by Harry A. Gordon, Ralph R. Wells and associates, has been established at 1744½ Berkeley street.

SAUGUS, CALIF.—Bernite Powder Co., 22,000 Soledad road, will build a storage building 40 x 200 feet, to cost about $15,000.

VENICE, CALIF.—Arcturus Mfg. Corp., 4301 Lincoln boulevard, has building permit for a machine shop 60 x 98 feet, to cost about $10,000.

WHITTIER, CALIF.—Sparky Adams' Welding & Mfg. Co. has been formed by Arthur A. Adams and is conducting business at 2051 South Painter avenue.

OREGON

PORTLAND, OREG.—Shofner Iron & Steel Works, 2770 NW Yeon avenue, Chester Sheppard, president, has obtained WPB Priorities for additions and alterations to its plant and is seeking Defense Plant Corp. funds.

WASHINGTON

WALLA WALLA, WASH.—Continental Can Co. has let contract to the Austin Co., Dexter Horton building, Seattle, for a one-story warehouse addition 140 x 300 feet, to cost about $100,000.

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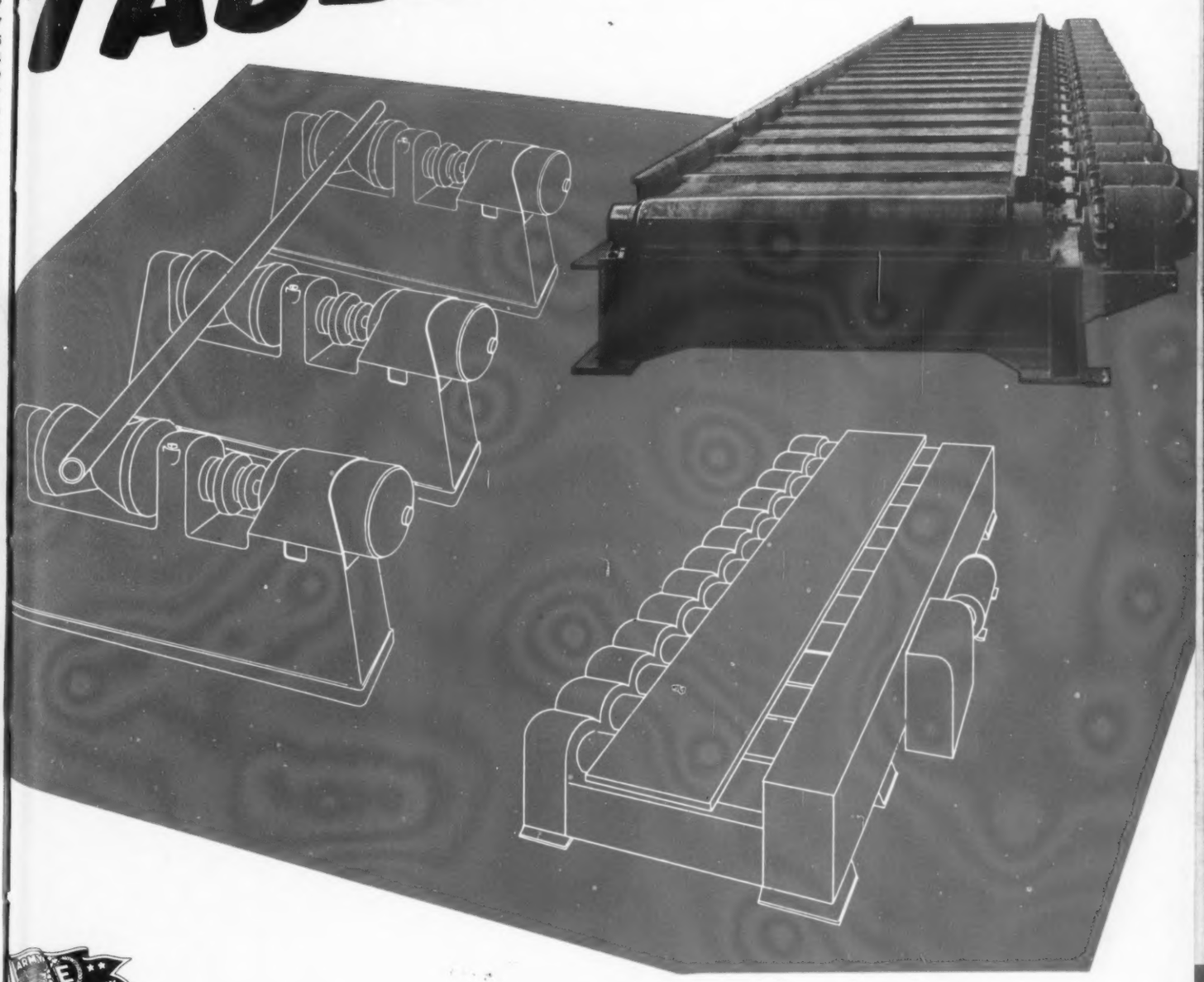

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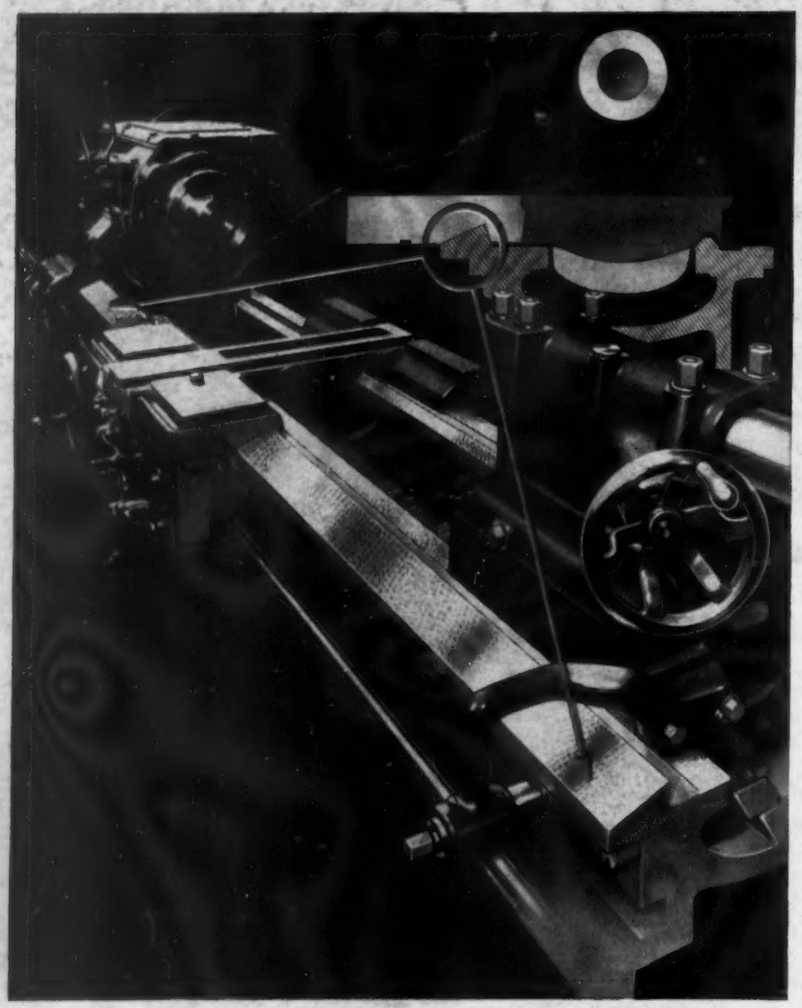

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